

The Milbank Memorial Fund  
**QUARTERLY**

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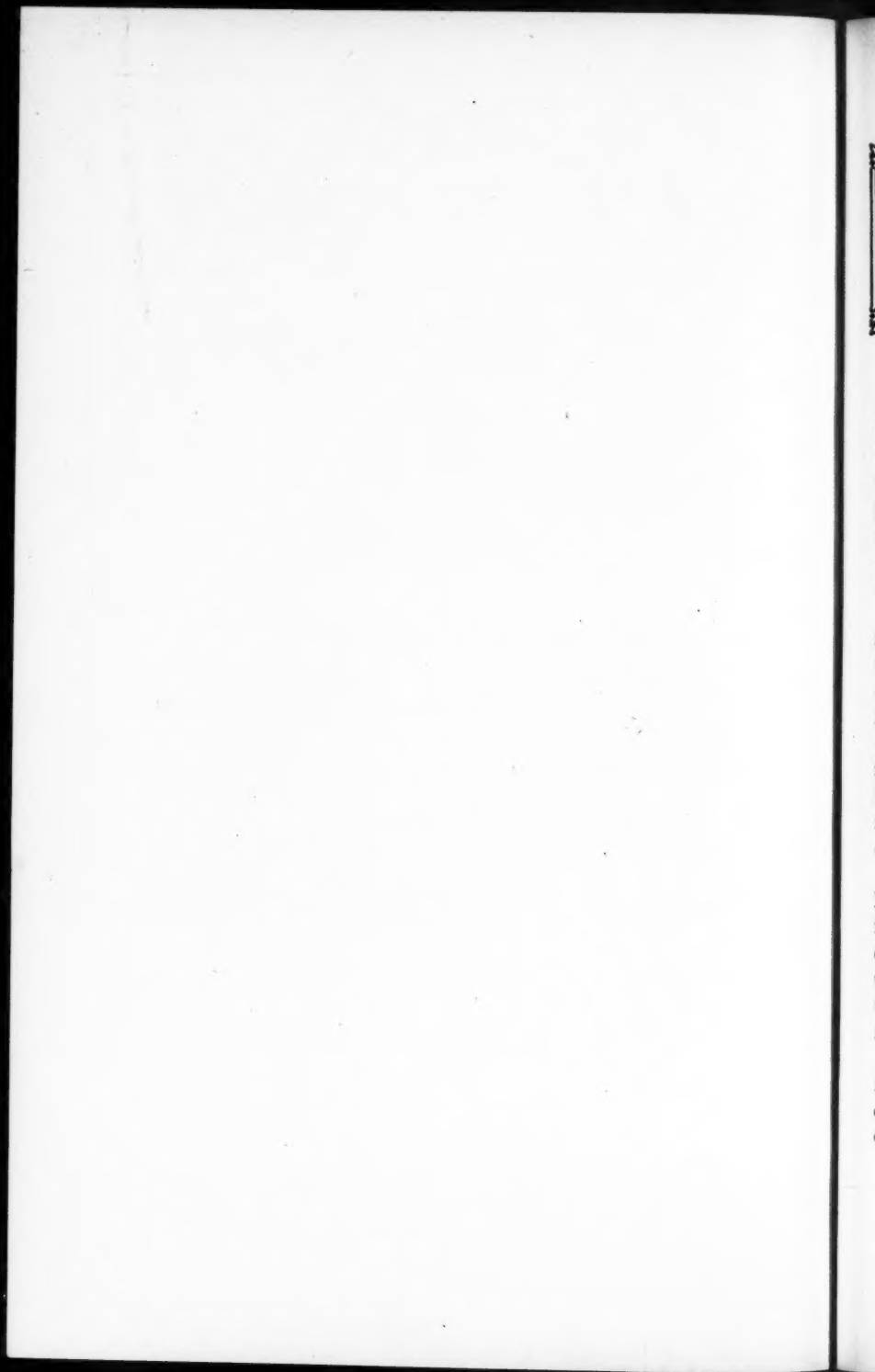
Vol. XXII

OCTOBER 1944

No. 4

Edited by the Technical Staff

Published quarterly by the MILBANK MEMORIAL FUND, 40 Wall Street,  
New York 5, New York. Printed in the U. S. A. Subscription: \$1.00 a year.



## IN THIS ISSUE

At the Fund's Twenty-second Annual Conference the Round Table on "New Steps in Public Health" devoted its sessions to a discussion of present problems of public health and how the problems can be solved. Four papers, illustrating the needs of various groups in the community for relief from illness and disability and for disease prevention and health promotion, served as a background for the discussion. These papers appear in this issue. The remaining papers, which deal with various approaches to solutions of the problems of public health, will be published in the January, 1945, *Quarterly*.

The first paper of the series, "Findings of the Study of Chronic Disease in the Eastern Health District of Baltimore," by Jean Downes of the Fund's staff, presents a discussion of illness and disability of persons with chronic disease and of the other members of their families. These families formed about one-fourth of the total observed population. Illness rates related to the family as a unit indicated that persons in chronic disease families had 54 per cent of the total illnesses, 40 per cent of the total hospitalizations, and received about 50 per cent of the medical care for illness given to the total population. It is apparent that illness is an especially heavy burden to certain families.

"The Peckham Experiment," a pioneer health center established in London in 1926, was discussed by Dr. George Baehr. Because of dissatisfaction with preventive medical work, this particular health center was established to provide preventive medical services to family units, rather than to casual individuals. Dr. Baehr describes the unique qualities of the experiment and discusses some of its results which may have a bearing upon the solution of problems of public health in this country.

The findings of the present Selective Service examinations have indicated a pressing need to build a healthy population. About 45 per cent of the young men examined were rejected for Army service for physical or mental reasons. The leading causes of rejection for service in the

present war and for service in World War I are discussed in some detail by Mr. George St. John Perrott. The implications of the data, as pointed out by Mr. Perrott, should promote the planning of health services so that future generations of young men and women may have the maximum possible health and vigor.

Malnutrition as an industrial health problem is discussed by Dorothy G. Wiehl of the Fund's staff in an article on "Recent Findings on Nutritional Status of Industrial Workers." Both dietary surveys and health examinations have revealed a high prevalence of dietary inadequacies among employees in industrial plants. Conditions mentioned which contribute to unsatisfactory diets include ignorance of dietary needs, the widespread habit of eating little or no breakfast, the poor quality of mid-shift meals due sometimes to improper choice of foods but often to grossly inadequate food services in and near industrial plants. It is suggested that industrial management should assist in developing programs for the promotion of better nutrition among workers.

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The July *Quarterly* carried four of the seven papers presented at the Round Table on Demographic Studies of Selected Areas of Rapid Growth, held in connection with the Fund's Twenty-second Annual Conference. The remaining three papers are published in this issue, and bound volumes of the total series will soon be available.

Two of the papers in this issue are devoted to population problems in Egypt and the third to general problems of policy in relation to areas of heavy population pressure. In "The Demographic Position of Egypt" Dr. Clyde V. Kiser presents the factual materials regarding growth and increasing density of population, the high rates of fertility and mortality, and the accompanying problems of poverty and illiteracy in Egypt's Nile Valley. This paper is followed by "A Population Plan for Egypt," by Dr. W. Wendell Cleland, of the faculty of the American University at Cairo since 1917. Although he offers specific proposals for rehabilitation, Dr. Cleland also emphasizes the great difficulties of their execution. One difficulty is the apathy of the people themselves, owing to acute poverty, widespread illiteracy, and the enervating effects of worm diseases common in that area.

The concluding paper in this series, "Problems of Policy in Relation to Areas of Heavy Population Pressure," was prepared by Dr. Frank W.



Notestein, who served as Chairman of the Round Table mentioned above. This paper, in contrast to Dr. Cleland's, offers no specific prescriptions for specific countries. Instead, it deals in principle with a number of countries in which pressure of population on resources is already high, in which a high growth potential is negated only by high mortality, and in which population growth will impede the future economic and political development. For areas of this type, Dr. Notestein discusses the demographic situation, the possibilities for checking growth, solutions to the problems of pressure, and general implications of these factors for policy.

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# FINDINGS OF THE STUDY OF CHRONIC DISEASE IN THE EASTERN HEALTH DISTRICT OF BALTIMORE<sup>1</sup>

JEAN DOWNES<sup>2</sup>

THE chief objective of the five-year study of illness in the Eastern Health District of Baltimore was to obtain an accurate and complete picture of the extent of chronic disease in a closely observed population. The white families living in thirty-five city blocks scattered throughout Wards 6 and 7, formed the sample population. The sample was found to be representative of the district from which it was drawn with respect to age constitution, size of household, and home ownership.

A general description of the population of the Eastern Health District may give some idea of the background from which the sample was drawn. The two city wards comprising the district had in them about 11,000 white families or households, and 2,800 colored households. As far as the white population is concerned, the district was considered as fairly representative of the localities in the city in which the wage-earning population live; that is, it contained some families in relatively poor economic circumstances, wage-earning families in moderate circumstances, relatively few families in the professional class, and no families that could be classed as wealthy.

There are three hospitals within the Eastern Health District and two just beyond its boundaries. Each of these hospitals has an outpatient department. Approximately 150 private physicians practiced regularly within the district. However, during the period of

<sup>1</sup> The Five-Year Study of chronic disease in Baltimore is a cooperative study conducted by the United States Public Health Service and the Milbank Memorial Fund in cooperation with the Johns Hopkins School of Hygiene and Public Health and the Baltimore City Health Department.

The data summarized in this report were presented previously in the following papers: Downes, Jean: Chronic Disease Among Middle and Old-Age Persons. The Milbank Memorial Fund *Quarterly*, January, 1941, xix, No. 1, pp. 5-25. Downes, Jean: Illness in the Chronic Disease Family. *American Journal of Public Health*, June, 1942, 32, No. 6, pp. 589-600.

<sup>2</sup> Milbank Memorial Fund.

study slightly more than 400 different private physicians served the observed population.

One point of special interest in the study was to observe the extent to which medical care for illness was obtained by a population which had an unusual amount of facilities for care within the immediate neighborhood.

It was considered important to obtain illness records from the family at fairly frequent intervals so that the minor cases of sickness would not be missed. Consequently, monthly visiting was initiated in this study.

In the studies of illness conducted by periodic canvasses of families "illness" is usually understood as any affection or disturbance of health which persists for a considerable part of one or more days. However, no definition of illness is set forth and the records of illness are of sickness reported by the household informant (usually the housewife), either as experienced by herself or as she had observed them in her family.

For all cases of illness and for cases of preventive medical care a record was made of the nature of medical service received and whether rendered by a private physician, clinic, or hospital. The causes of illness as reported by the family informants were submitted to the attending physicians for confirmation or correction. The causes of illness for clinic attendance and hospital admissions were also checked against the records of the clinic or hospital where the service was given.

#### ILLNESS AMONG CASES OF CHRONIC DISEASE

It is necessary to define what is meant by a chronic condition or disease. The term "chronic" disease usually includes those diseases or affections which have as a common characteristic a relatively long duration in time, in contrast to the term "acute" which denotes short duration. The diseases or affections of a chronic nature which have been selected for presentation are as follows: Persons with a

manifest mental disorder, the psychoneurotics, psychopathic personalities, and personality or behavior disorders; heart disease, hypertension or high blood pressure; arthritis; diabetes; varicose veins; gall-bladder disease; peptic ulcer; chronic nephritis; cancer; rheumatic fever; tuberculosis; and syphilis.

The relative frequency of these chronic disorders in the population 5 years of age and older was as follows: Out of each 1,000 persons in the population there were 32 cases of hypertension or heart disease, 18 cases of manifest and subclinical mental disorders, 16 of arthritis, 7 of rheumatic fever, 6 cases of diabetes, and 11 cases of other chronic condition. This means a total prevalence of these chronic illnesses of 90 per 1,000 population.

During a given interval of time the population may be divided with respect to illness into three classes: (1) those who reported no illness; (2) those who experienced one or more illnesses of acute nature only; and (3) those reporting the presence of a chronic condition. As a background for the discussion of illness among chronic-disease patients and their families, it is of interest to present a picture of the total population with respect to the three classes just cited.

Figure 1 shows for males and females, respectively, during a twelve-month period the proportion at various ages which had one or more acute illnesses, those with chronic disease, and those with no illness. It is apparent that the percentage of persons of both sexes reporting some illness was relatively high at the two extremes of life, at the very young ages and in old age. Conversely, the proportion of persons reporting no illness is highest in young adult life and lowest among the young and the old. It is apparent also that chronic disease is present among persons of both sexes under 20 years of age and that disease of a chronic nature plays an increasingly important part in the proportions sick after age 30 is reached. Among persons 60 years of age or older, 50 per cent of those reporting illness have chronic disease.

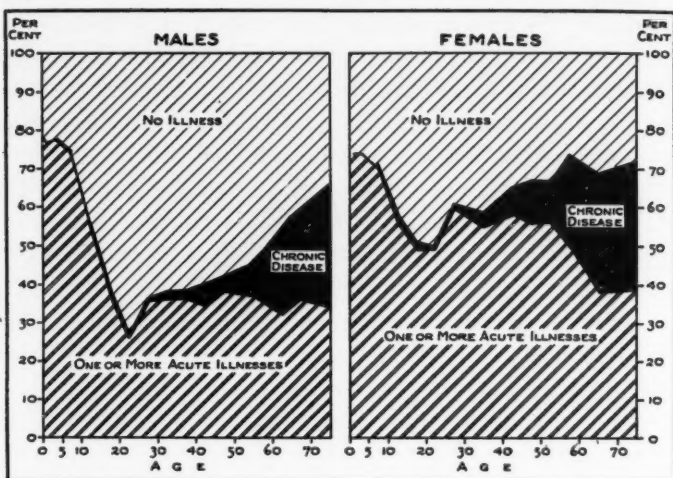


Fig. 1. Proportion of the total population by sex who (1) reported no illness; (2) reported the presence of chronic disease; and (3) those who reported only one or more acute illnesses in 1,243 canvassed white families. Eastern Health District of Baltimore, 1938-1939.

*Ambulatory Cases of Chronic Disease.* We have been interested in the risk of illness and disability of the ambulatory chronic disease patient 40 years of age or older. In this group there were 86 males and 153 females who reported the presence of chronic disease at the beginning of the first year of the study and were ambulatory at the time. Only 16 per cent had their first diagnosis of the condition less than a year before our observation and 46 per cent were diagnosed five years or longer before the beginning of the morbidity study. The diagnosis was made either by a private physician or a physician at a hospital clinic.

Attacks of illness of the chronic disease patient may be divided into (1) those of a nonchronic nature which are chiefly respiratory illnesses and accidental injuries, and (2) those attacks of illness which are manifestations of the particular chronic disease from which the patient was suffering.

When the frequency of attacks of illness of a nonchronic nature

are considered, the chronic disease patients had a rate of illness 62 per cent higher than the rate for persons of the same age who were reported as having no chronic disease. Had acute manifestations of the particular chronic disease suffered by the patient been included, the excess in illness would have been even greater.

It is of interest to know whether attacks of illness of a nonchronic nature were more severe among persons with chronic disease than was true for persons with no chronic condition. This may be shown by presenting disabled days, bed days, and hospital days in relation to disabling attacks of illness. During the course of a year new cases of chronic disease were diagnosed in the population under observation. These have been added to the total known at the beginning of the year.

Table I shows the disabled days, bed days, and hospital days per disabling attack for the two groups of population by sex. Disabling attacks for the chronic disease population are shown according to attacks which were acute manifestations of the particular chronic disease from which the patient was suffering and attacks of illness of a nonchronic nature.

Some explanation of how it was possible to relate a disabling attack of illness of a patient to the particular chronic condition from which the patient was suffering is appropriate at this point. The cooperation of the private physicians in checking and correcting the diagnosis reported by the patients, and the cooperation of the hospitals in allowing us to check our records against theirs made this possible. For example, a patient with rheumatic heart disease reported a disabling attack of what he called acute indigestion. The attending physician designated the disabling attack as due to rheumatic heart disease. Or another patient, with coronary disease, may have reported a similar attack of pain which the physician called angina pectoris. In this analysis, such attacks are classified as attacks of chronic illness though they were reported to us in terms of complaints or symptoms.

Among males with chronic disease there were 48 disabled days, 17 bed days, and 7 hospital days per disabling attack of all disabling illness. These rates were approximately twice as high as for the rest of the male population where the disabled days, bed days, and hospital days per disabling attack were 18, 7, and 4, respectively. However, when disabling attacks of illness of a nonchronic nature among the chronic disease population are considered, there is very little difference in the two population groups in the amount of disability per disabling attack.

Females with chronic disease had on the average 30 disabled days,

Table 1. Disabled days, bed days, and hospital days per disabling attack of illness among ambulatory chronic-disease patients and among persons with no chronic disease. Eastern Health District of Baltimore.<sup>1</sup>

CLASS	NUMBER OF ATTACKS OF ILLNESS CAUSING DISABILITY	DAYS PER DISABLING ATTACK			NUMBER		
		Dis- abled Days	Bed Days	Hos- pital Days	Dis- abled Days	Bed Days	Hos- pital Days
<i>Ambulatory Cases of Certain Chronic Diseases</i>							
<i>118 Males</i>							
Disabling Illness	92	48.0	16.7	7.0	4,412	1,537	642
Chronic <sup>a</sup>	51	69.4	25.0	10.7	3,537	1,276	548
Nonchronic	41	21.3	6.4	2.5	875	261	104
<i>195 Females</i>							
Disabling Illness	229	30.1	6.6	1.9	6,898	1,512	436
Chronic <sup>a</sup>	110	38.6	8.5	2.8	4,241	933	306
Nonchronic	119	22.5	4.9	1.1	2,657	579	130
<i>Persons Reporting One or More Illnesses of a Nonchronic Nature</i>							
276 Males	132	18.3	7.2	3.6	2,412	949	479
412 Females	262	14.4	3.5	1.1	3,781	918	278

<sup>1</sup> Based on persons 40 years of age and older.

<sup>2</sup> Disabling illnesses from chronic disease are acute manifestations of the particular disease from which the individual was suffering.

Disabling illnesses from the minor chronic diseases are treated identically in all population groups.



approximately 7 bed days, and 2 hospital days per disabling attack of all disabling illness. This was approximately twice the disability per disabling attack suffered by the females in the population with no chronic disease where there were 14 disabled days, 4 bed days, and 1 hospital day per disabling attack. As was the case with males, attacks of illness of a nonchronic nature among females with chronic disease were fairly similar to those for the population with no chronic disease.

From these data there is no evidence that the presence of chronic disease in ambulatory patients causes disabling attacks of illness of a nonchronic nature suffered by them to be more severe when measured in terms of disabling days, bed days, and hospital days per disabling attack than are similar attacks among persons with no chronic illness.

Table 1 indicates also the important part that disabling attacks of chronic disease play in the amount of disability suffered by the ambulatory case.

Table 2. Proportion of disabled days contributed by ambulatory cases of chronic disease, nonambulatory cases, and persons with no chronic disease during twelve consecutive months. Eastern Health District of Baltimore.<sup>1</sup>

CLASSIFICATION OF PERSONS	PER CENT				NUMBER			
	Dis-abled Days	Bed Days	Hos-pital Days	Pop-ulation	Dis-abled Days	Bed Days	Hos-pital Days	Pop-ulation
TOTAL	100.0	100.0	100.0	100.0	23,832	8,892	4,536	1,727
Ambulatory Chronic Cases	47.5	34.3	26.0	18.1	11,310	3,049	1,178	312
Nonambulatory Chronic Cases <sup>2</sup>	24.8	44.7	57.3	1.7	5,922	3,976	2,601	29
Persons With No Known Chronic Disease	27.7	21.0	16.7	80.2	6,600	1,867	757	1,386

<sup>1</sup> Based on persons 40 years of age and older.

<sup>2</sup> Nonambulatory chronic cases include all institutional cases, all cases of active tuberculosis, cancer, and cases of other chronic diseases confined to bed throughout the year.

Another important point brought out by this analysis is that disabling attacks of chronic disease were more severe among males than among females. Other analyses of the data from this study have confirmed these findings. They are of special interest in the light of the fact that mortality at these ages is higher among males than among females; yet, illness occurs more frequently among females than among males.

*Ambulatory and Nonambulatory Cases of Chronic Disease.* To show the full effect of chronic disease in terms of disabled days in the population 40 years of age and older, it is necessary to include the nonambulatory as well as the ambulatory cases of chronic disease; that is, bedridden cases of cancer, active tuberculosis, and all institutional cases.

Table 2 shows for both sexes combined the proportion of the total disabled days, bed days, and hospital days which were due to (1) ambulatory chronic cases; (2) nonambulatory chronic cases; and (3) to persons with no chronic disease. Persons with no chronic disease formed 80 per cent of the population and were responsible for only 17 per cent of the hospital days, 21 per cent of the bed days, and 28 per cent of the disabled days. It is apparent that most of the disability suffered from illness in the population 40 years of age and older was concentrated in a small proportion of the total population at those ages.

#### THE CHRONIC DISEASE FAMILY

Another analysis of illness has indicated that the members of families selected on the basis of the presence of a case of chronic disease in them had an excess rate of illness among their members as compared with the remaining population. This was true of the family members when the chronic disease patients were excluded.

During the second year of the study of illness there were 381 families with one or more chronic cases. One hundred and forty were included because of a case of heart disease or one of hyperten-

sion; 79 because of mental disease, mental deficiency, or neurasthenia; 69 because of a case of arthritis; 24 because of diabetes; 25 because of rheumatic disease; and the remaining 44 families were selected because of a case of chronic gall-bladder disease, or peptic ulcer, or nephritis, or cancer, or tuberculosis, or syphilis.

In the 381 families, the members with no chronic illness constituted a population of 912 years of observation. Their illness rate can be compared with the rate in 1,376 families in which there were no cases of chronic illness reported. There were slight differences between the two groups of families with respect to the proportions that were migrant families, home owners, and with respect to size of family. For example, the average size of the 1,376 families was 3.8 persons, compared with 4.2 persons in those selected on the basis of a case of chronic disease.

When the two groups of families are classified according to the occupational class of the head of the household, a striking similarity between the two groups was noted. From 25 to 27 per cent of the heads in each group were engaged in some form of business, approximately 60 per cent were classed as skilled or semiskilled workers, and 12 per cent as unskilled workers.

There were no important differences between the two groups of population with respect to age when children under five, and when the chronic disease patients were excluded, so that it is quite suitable to compare the rate of illness and of medical care in one population with the rates noted in the other.

In the following discussion of illness and medical care, confinements as a cause of illness are excluded. The relative levels of illness for the three population groups can best be shown by Figure 2 which shows the ratio of the rate of illness for chronic-disease families, Group 2, and patients, Group 3, to the rate for the rest of the population. The chronic-disease patients, represented by the black bars, had illness rates from 43 to 58 per cent higher than were noted for the general population, and members of their families,

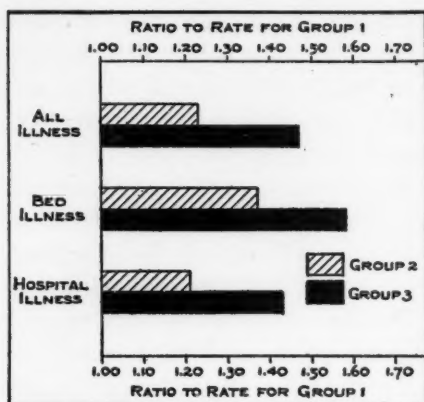


Fig. 2. Ratio of the rate of illness for populations of Group 2 and 3 to the rate for Group 1.

Medical care may be expressed in relation to attended cases of illness. The data for illness of a nonchronic nature are shown in Figure 3. The mean number of physician visits per attended case

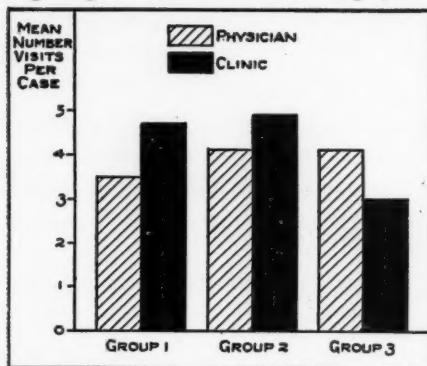


Fig. 3. Mean number of physician and clinic visits per attended cases in three population groups.

had an average of 3 clinic visits per case.

The three groups of population show a striking similarity in that about 33 per cent of all attacks of illness in each group received

from 23 to 37 per cent higher. If bed illness and hospital illness be considered an index of severity of illness, it is apparent that the excess in illnesses in the chronic-disease families, over illness in the general population, was in large part due to a considerably greater frequency of the more severely disabling illnesses.

varied from 3.5 in the families with no chronic disease (Group 1) to slightly more than 4 per case in the chronic-disease families. Clinic visits per clinic-attended case were similar for the populations of Group 1 and 2 with a mean number of visits of approximately 5. Chronic-disease patients (Group 3),

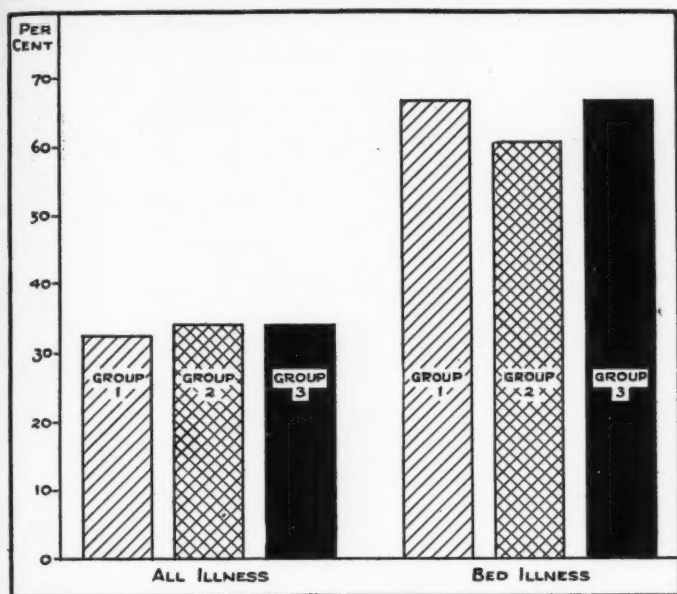


Fig. 4. Per cent of illness having medical care in three population groups: (Group 1—families with no chronic disease; Group 2—nonchronic members of chronic disease family; and Group 3—chronic disease patients).

medical care; also from 61 to 66 per cent of the bed illnesses had medical attendance. These data are shown in Figure 4. If attended cases of illness in this particular population, where physicians' care and clinic care for illness is considered to be available to an unusual degree, may be interpreted as a reliable reflection of severity of illness, the surprising similarity in the three groups of population is of considerable interest. It would seem to indicate that, regardless of the level of illness, either bed or all illness, a certain proportion will be severe enough to be thought by the individual to warrant medical care.

Acute episodes of illness of a chronic nature among ambulatory patients did not follow the same pattern with respect to medical care as illnesses of a nonchronic nature. Sixty-nine per cent of all attacks

of chronic illness and 82 per cent of bed illnesses had medical attendance. This again emphasizes the severity of acute manifestations of chronic disease.

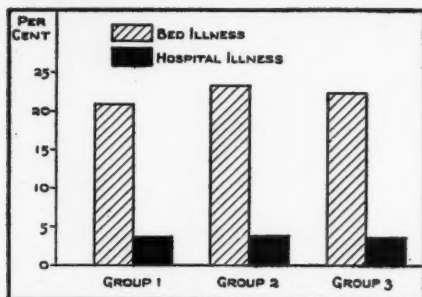


Fig. 5. Per cent of total illness that was bed illness and hospital illness in three population groups.

variation. From 22 to 26 per cent of the total illnesses were bed illnesses. The proportion of the total illnesses that were hospital cases was identical for each of the three groups—4 per cent. It should be emphasized that confinements as a cause of illness have been excluded from all groups of population and, for chronic patients, attacks of illness considered to be due solely to the chronic disease or condition have been excluded from the data presented in this chart. It is interesting that the proportion of illness of a nonchronic nature which required a period in bed and those which required hospitalization was very uniform in the different populations, regardless of the level of illness. This can be explained on the basis that the relative excess over the rate for the general population (Group 1) was approximately the same for these classes of illness and for all illness.

The discussion so far has omitted a presentation of all medical care for the 425 ambulatory patients with chronic disease. The rate of physician visits for chronic disease was 2,375 per 1,000 population or slightly more than two visits per person per year. The rate of clinic visits was 1,517 per 1,000. This means a total amount of

Another point of interest is a comparison of the three groups of population with respect to the proportion of illnesses of a non-chronic nature that were bed illnesses and that were hospital illnesses (Figure 5). Again the three groups show very little

medical care for the chronic condition of four visits per person per year. The same population group had an additional 2.5 visits per person for illness of a nonchronic nature. Chronic-disease patients had from 3 to 4 times as much medical care for illness as did the other members of their families and the general population studied.

Persons in the 381 chronic-disease families formed 26 per cent of the total observed population, had 54 per cent of the total illnesses, and received about 50 per cent of the medical care for illness given to the total population. Persons from these few families also constituted almost 40 per cent of the persons hospitalized during the second year of the morbidity study.

In conclusion, the records of two families are given to illustrate the sickly and the nonsickly family.

*Family No. 1.* This family, observed for five years, consisted of a husband aged 31, a wife aged 38, and two children aged 12 and 3, respectively. One private physician attended the family throughout observation.

The wife was diagnosed at a psychiatric clinic, before the beginning of the study, as having an anxiety neurosis. She also had periodic attacks of hay fever. Her illness record for the five-year period is as follows: 2 attacks of acute bronchitis, 4 attacks of acute tonsillitis, 8 colds (2 disabling), 4 attacks of neuralgia, and 2 accidents (both of a minor nature). She had a total of 20 illnesses with 21 private-physician visits.

The husband reported no chronic condition when first observed; later he complained of extreme nervousness. His illness record is as follows: 9 colds (2 disabling), 2 attacks of bronchitis (both disabling), 1 disabling attack of grippe, 3 accidents (2 disabling), 2 attacks of gastro-enteritis, and 1 hospital admission for operation for hemorrhoids. He had a total of 18 illnesses, 9 of them disabling. There was a total of 23 physician visits.

The daughter, aged 12, during the course of the study was diagnosed as having neurotic traits and as a behavior problem. Her



illness record included: 1 illness from peritonsillar abscess, 1 streptococcus sore throat, 8 colds, 1 accident, and 5 attacks of illness designated as "pain in the side." She had in all 17 attacks of illness, 8 of them disabling, and 8 physician visits.

The child 3 years of age had the following illnesses: 14 colds, 4 attacks of sore throat, 2 attacks of tonsillitis, 1 attack of grippe, 2 illnesses from an abscessed ear, 1 attack of conjunctivitis, 1 attack of gastro-enteritis, 3 accidents, measles, and when last observed he had whooping cough. In all he had 30 attacks of illness, with 13 private-physician visits.

This four-person family had in five years 85 attacks of illness and 65 physician visits. The striking points about this family's illnesses are (1) that more than one member was diagnosed as neurotic or as having neurotic traits, or had a complaint of nervousness; (2) repeated family epidemics of acute tonsillitis, streptococcus sore throat, and other respiratory conditions; and (3) all members of the family had at least one accident during the five years of observation.

The two children had preventive medical care in that both had vaccination against smallpox and immunization against diphtheria.

The daughter, aged 12, had 4 school medical examinations. There was a recommendation for the removal of her tonsils, for dental care, and for eye care. Dental defects and eye defects were corrected, but the recommendation for tonsillectomy was not followed.

*Family No. 2.* This family, also observed for five years, consisted of a husband 55 years of age, a wife aged 44, a daughter aged 15, and four sons aged 13, 11, 8, and 4, respectively.

The wife had chronic rheumatism. She had one cold during the five years of observation and one visit from the private physician.

The husband had two colds with 13 physician visits.

The daughter, aged 15, had one cold and one physician visit.

The child 8 years of age had one accident and one attack of bronchitis with medical care for each.



The three children aged 13, 11, and 4 had no illness during the five years studied.

This seven-person family had a total of 6 illnesses, with 22 physician visits in a period of five years.

Three of the children had school health examinations; all were reported to be in good physical condition. Two of the children had dental care for extraction of deciduous teeth. All had had immunization against diphtheria and vaccination against smallpox.

Acknowledgments are made to the Johns Hopkins School of Hygiene and Public Health, especially to the Departments of Epidemiology and Biostatistics, for generous assistance and cooperation which have greatly facilitated the carrying on of the study of illness in the Eastern Health District of Baltimore; to the Baltimore City Health Department for generous assistance and cooperation, especially in the matter of relationships with the medical profession.

## THE PECKHAM EXPERIMENT

GEORGE BAEHR, M.D.<sup>1</sup>

THE pioneer health center in London, the so-called Peckham Experiment, was established in 1926 through the thoughtful planning of a group of persons under the leadership of Dr. G. Scott Williamson and Dr. Innes Pearse. Dr. Williamson was appointed a research fellow for this purpose, by the Sir Halley Stewart Trust, and he directed the activities of the experiment throughout these years.

Because of dissatisfaction with preventive medical work, it was determined to establish a small pioneer health center to provide preventive medical services to family units, not to casual individuals. A location was selected in South London, in the Borough of Peckham, so as to extend the observations over a broad range of economic levels rather than to concentrate upon the extremely underprivileged. This section of London provides such material: people employed in different types of industries, and small shopkeepers—economic levels from the poorer groups up to the middle class.

The first experiment started in 1926. Within a year, several hundred families in the area had joined and were given a health overhaul; most of them have continued as members of this health club. The service was not free. It was offered to families for small payments, a shilling a week per family, sufficiently small so as not to deter them from using it.

The pioneer quarters were soon outgrown. It was realized that one could not retain families in such an enterprise and hold their interest unless they received something more than a periodic health examination. To hold the interest of the members and secure their intimate cooperation in the project, the building had to have a club-like atmosphere and at the same time be a consultation center to which people rallied for social as well as health reasons.

After a period of seven years, additional funds were secured to

<sup>1</sup> Director of Clinical Research, Mt. Sinai Hospital, New York.

build an appropriate structure that would care for 2,000 families. The new center was in operation for about four and a half years when the war terminated its activities, partly because of the dispersal of the population and of the professional participants. It closed temporarily some time in 1939.

Although the families joined primarily because of the health services that were offered, it is important to emphasize that the incentive that held the families, and in many instances, persuaded them to join, was the club-like facilities which in the second and more permanent structure were developed rather extensively. A family was often persuaded to join because one of the children had been brought to the health center by some schoolmate whose family belonged. In this manner, the family was introduced by the child to the social and recreational activities of the organization, and they then learned to appreciate the influence upon the health of the family that could be derived from a family membership.

Once they joined, most families continued to maintain their membership enthusiastically, in spite of the fact that they were charged one shilling a week per family. For this small weekly payment, the children could participate in all sport and recreational activities without charge; the adults paid small fees of sixpence or less for certain of the recreational activities in which they joined. Although the total membership by families never reached 2,000 before the experiment had to be terminated, it came fairly close to that—about 1,500, I believe. The small weekly fees for the family memberships and the small fees for the use of recreational activities by the adult members of the families would have defrayed the entire maintenance cost of the project as soon as the membership had reached 2,000 families, a goal which was being approached when the experiment was temporarily ended. The payments for family members would have met half the cost of the enterprise and the small contribution from the adult members for the use of the recreational and social facilities would have provided the rest.

The health overhaul, which initiated the family's relationship to the center, was carried out according to a definite pattern. After the individual members of the family had been examined by the medical staff, a family conference was held with members of the staff. At this family consultation hour, the problems of the youngest members were taken up first, and so on up to the adults. As the younger members of the family were disposed of, they were allowed to go to some of the recreational rooms—the swimming pools, the gymnasium, the playrooms of various kinds—or to the study rooms where children coming from school could do their homework. The adult members of the family and perhaps the older children remained behind for the formal consultation and for the answering of the many problems which they brought to the consultation hour.

Once they joined, the people were given complete freedom to use all the facilities of the Center with little or no direction. They were encouraged to develop their own health or recreational activities as a result of contact with one another and contact with the full-time members of the staff. The people themselves gradually took over the responsibility for most of the activities of the Center. Only a small nucleus of a few full-time members of the staff was available to assist them.

A surprisingly large number of people were found to require medical as well as social advice and guidance throughout the period of their membership. At the time of the initial family health overhaul, the members were classified into three general groups. The first group included those who had actual disease—meaning *dis-ease* in the literal sense of the term—people who knew they had disabilities and complaints and subjective abnormalities. They were found to constitute roughly about 32 per cent of all members. Another 59 per cent were in a state of well-being, but physical examination disclosed disorders—some of them important disorders—of which they were entirely unconscious. And only 9 or 10 per cent were labeled as absolutely healthy people in whom

physical disturbances of no kind could be found. Of course, these percentages depended on the meticulous detail and the thoroughness with which examinations were made, and on the standards for judging the presence of organic or functional disabilities.

As a result of the membership of families in the Health Center over the years, these percentages, however, were materially improved by correction of the disabilities and by improvement of living standards.

The Peckham Experiment, then, was really a combination of a health center, a club, and the settlement activities with which we are familiar in this country. Its significance for the maintenance of health and the prevention of disease is far greater than that of any other form of preventive medicine that has as yet been attempted experimentally, because it was designed to guide families and helped them to guide one another in all medical, social, and environmental relationships which have an important bearing upon disease. A most important feature of the experiment was that new member families came under the influence of the member families who had been using the health service for some time.

As a family increased in size, professional advice and guidance were available as preparation for pregnancy as well as during the prenatal and postpartum periods. Pre-marital consultations were also available and were freely used.

The children, themselves, brought problems of their own into the Center, for which they sought guidance. At the Center, they found quiet space in which to do their homework after school, as well as facilities of all kinds in which to indulge their physical activities. Above all, they found people at the Center who were able to guide and advise them in a sympathetic manner.

The adolescents, with their special problems, found the advice and help which they needed. Those who were of the age when courtship and mating are the center of their interest found this counsel particularly valuable.

Problems of social poverty were often influenced by personal associations made between member families. The members developed an interest in one another. They influenced one another in their cultural development. Many developed a new breadth of vision in living. These new relationships had a bearing upon the diseases to which they were exposed.

A list of the welfare, educational, and health activities of the Center is impressive. It included an ante-natal clinic, post-natal clinic, birth control clinic, infant welfare clinic, care of the toddler, nursery school, immunization center, medical inspection of the school child, vocational guidance, sex instruction of adolescents, boys' and girls' clubs, sports clubs, and recreational clubs of all kinds. A country branch was established to which some of the family members could be sent during the summer, and to which people could be referred for convalescence after hospitalization or after illnesses in the home. The Center also provided space for keep-fit and gymnasium classes, adult cultural education, music, debates, drama classes and lectures of all kinds, citizens' advice bureau, holiday outings and expeditions, even a public billiard hall, dance hall, and place for social gatherings.

Among the therapeutic activities were the marriage advice bureau, mothers' clinic, child guidance clinics, school care committee work, poor man's lawyer, hospital almony, which corresponds to our hospitals' social service, hospital follow-up, including all forms of after-care in the home or convalescent place for members discharged from medical care, and finally even a rehabilitation clinic. No actual medical therapy was practiced, but members were brought into relationship with the proper agencies responsible for the technical part of rehabilitation or other services.

The venture came to be called the Peckham Experiment in order to get away from the narrow idea of a health center. It was a demonstration that families of a mixed economic group will gather together if proper facilities are provided. They will get the idea of

health through proper living and will cooperate and stick to it over the years. Almost equally important is the demonstration that such a project can be self-supporting when adequate membership has been reached and the facilities of the institution are completely utilized.

Those who are interested should read the three publications on this subject. The first appeared about the time when the pioneer health center, the first experimental center, was established; it is called "The Case for Action." The second, which appeared a few years ago, shortly after occupancy of the new building, is called "Biologists in Search of Material." The third, which has just appeared, is called "The Peckham Experiment—The Study of the Living Structure of Society." A fourth report is promised in the near future. The illustrations in the third publication give an excellent idea of the cordial response of the people to such an enterprise.

You will note that this family club, health club, or biologists' laboratory, as the founders prefer to think of it, is almost entirely made of glass and steel. The sponsors believe that this is important; the people coming into the Center never feel themselves isolated. They immediately become aware of all the various activities that are taking place and of the various services that are rendered, and are attracted to participate. The structure of the building is designed to discourage social isolationism.

The Peckham Experiment was indeed a study of the living structure of society by physicians trained in social medicine and human biology. A project of this kind could not fail to influence the many medical, environmental, hereditary, and social factors responsible for disease and dependency, and upon that all embracing condition called social poverty, the elements of which are to be found among all classes, but especially among people in the low economic levels.



## FINDINGS OF SELECTIVE SERVICE EXAMINATIONS<sup>1</sup>

G. ST. J. PERROTT<sup>2</sup>

THE average rate of rejection for physical and mental reasons of persons examined under Selective Service up to February 1, 1944, was about 45 per cent, compared with a figure of about 30 per cent during World War I. Because of a variety of factors it is impossible to appraise the two rejection rates in terms of the relative physical status of young men then and now. Differences in age composition, in examination standards, and in technique of the examining physicians make comparisons difficult. Furthermore, in the last war, all men were given physical examinations before classification for deferment. In the present war, physical examinations were given only to those young men who had no dependents or other reasons for deferment. This procedure may have tended to concentrate among examinees unemployed persons and others who might be expected to have a larger proportion of physical defects than the average.

Perhaps the most that can be said in comparing the gross rejection rates of the two wars is that there is certainly no evidence of any improvement in the physical status of young men since World War I.

Comparisons of the relative importance of different causes of rejection in 1917-1918 and today are of interest. In the charts, these have been set down in as comparable a form as the data permit. Figure 1A (1) gives the percentage of 2,700,000 men placed in class 4-F up to February 1, 1944, that were rejected for different causes and Figure 1B (2) shows the same information for the "second million" in the draft during World War I.

It will be seen that mental disease ranks first as a cause of rejection

<sup>1</sup> Published by permission of the Surgeon General, U. S. Public Health Service.

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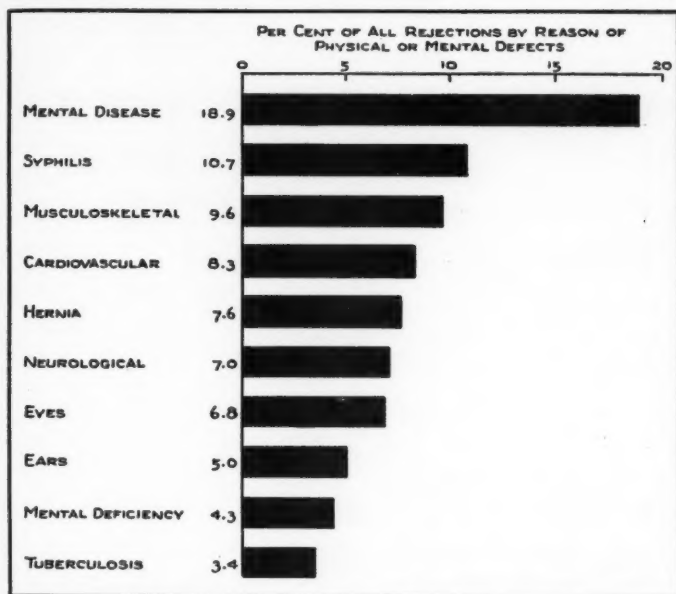


Fig. 1A. Rejection for physical or mental defects: Ten leading causes, as of February 1, 1944 (preliminary).

today but was tenth in 1917-1918. "Flat feet" which ranked high as a cause of rejection in World War I does not appear among the first ten causes today. More importance was attached to "underweight" in the last war than today.

It will be seen that the principal causes of rejection are much the same today as in 1917-1918. Among the first ten causes of rejection, there are only two types of defect which do not occur in both lists. These are defects of the feet which ranked high in World War I and syphilis which was second as a cause of rejection up to February 1, 1944, but did not appear among the first ten causes in 1917-1918.

Rejection rates for mental disease are obviously many times higher today than in World War I. The difference is largely in the psychoneurotic disorders, classed as mental alienation in the last war.

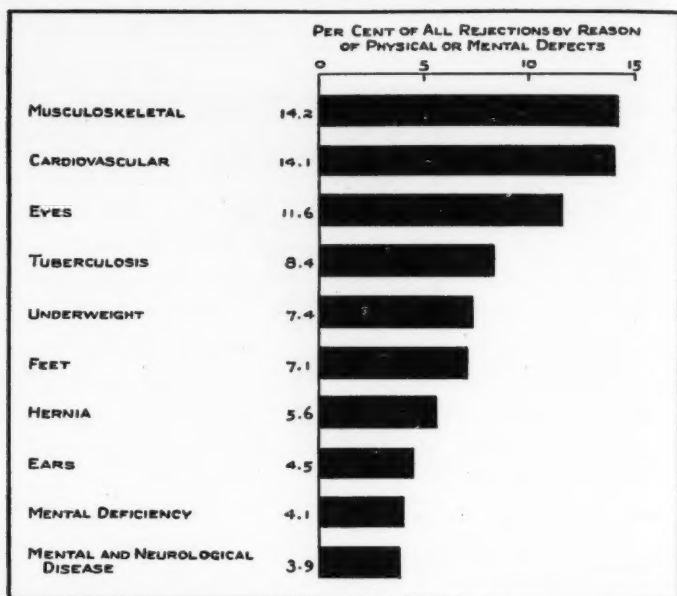


Fig. 1B. Rejection for physical or mental defects: Ten leading causes in World War I.

Rejections for mental deficiency and epilepsy, for example, were about the same in both wars. One reason for the higher rejection rate for psychoneurotic disorders is that these conditions have been found to constitute a very important cause of disability in the armed forces and consequently a concerted effort is being made to screen out such cases prior to induction.

In the early period of Selective Service operation, syphilis was a much higher cause of rejection than in the last war—23 per 1,000 men examined as compared with around 3 per 1,000 men in 1917-1918. With reduction in standards so that all uncomplicated cases of venereal disease are admitted, syphilis rejection rates are now running about the same as in the last war.

In the case of tuberculosis, the early results of the present draft

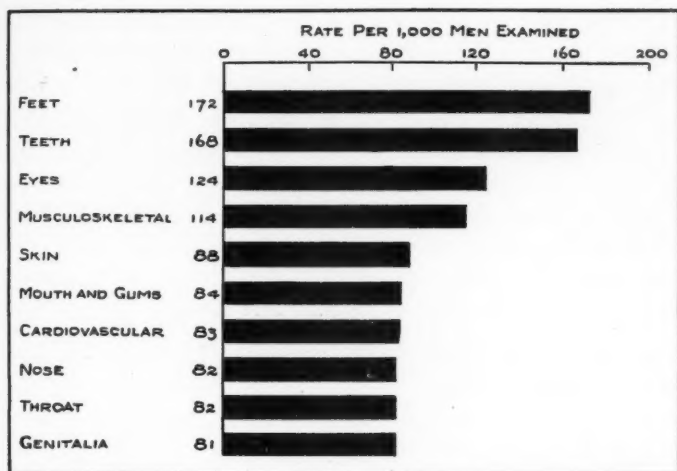


Fig. 2. Prevalence of defects. Ten most frequently recorded defects (broad groups) among 121,700 registrants 21-35 years, November 1940-September 1941.

seemed to indicate that rejection rates were about the same as in the last war, that is, about 2 per cent of all men examined. This was rather surprising in view of the fact that the death rate of young men in this age group had declined by two-thirds since 1920. The phenomenon was attributed to the fact that x-ray diagnosis was being used extensively in Selective Service examinations at the present time and that hence a better case-finding job was being done. Later results of Selective Service examinations, however, indicate an average rejection rate of slightly over 1 per cent or about one-half that of the last war.

The data in Figure 2 are of interest as showing the prevalence of defects found among young men examined between November 1940 and September 1941, whether or not the defect caused rejection (3).

Defects of the feet ranked first, being found in 17 per cent of all men examined. These were largely flat feet of varying degrees.

Tooth defects ranked second. These were a high cause of rejection

in the peacetime draft but are not now a significant cause of rejection because of lowered standards. The defects were classified as missing teeth, 36 per cent; needing dentures or having dentures, 20 per cent; caries, 24 per cent; and malocclusion and other dental defects, 20 per cent.

Eye defects, in third place, were classified as refractive errors, 25 per cent; partial blindness and blindness, 23 per cent; strabismus and various other defects of the eyes, 52 per cent.

In the musculoskeletal group, there are a great variety of conditions, either congenital or the result of accident, which are not concentrated in any particular classification. After-effects of poliomyelitis are not included here but are placed in the neurological group.

About 57 per cent of skin defects were diagnosed as acne and 13 per cent as fungus infections. Pyorrhea accounted for 60 per cent of the defects of mouth and gums and gingivitis 17 per cent. Arterial hypertension made up 20 per cent of cardiovascular defects. Deviated septum accounted for 50 per cent of nose defects. Hypertrophy of tonsils and tonsillitis made up 88 per cent of the throat defects.

Varicocele accounted for 50 per cent of defects of the genitalia.

Rejection rates during the period November 1940, through

Table 1. Principal defects in rejected men (4).

	REJECTION RATE PER 1,000 MEN EXAMINED	
	White	Negro
<i>A. Rate Greater Among Whites</i>		
Eyes	31.5	27.0
Ears	22.4	4.0
Teeth	8.8	4.5
Tuberculosis	15.2	11.1
Hernia	31.6	26.9
Mental Disease	52.4	32.4
Neurological	23.1	14.6
Musculoskeletal	37.4	32.4
Endocrine	5.9	1.8
Weight and Others	9.5	6.6
<i>B. Rate Greater Among Negroes</i>		
Cardiovascular	33.8	42.5
Genitalia	4.3	13.1
Syphilis	14.9	170.5
Other Venereal Diseases	1.2	18.2
Mental Deficiency	10.7	19.0
Educational	19.0	99.8
Feet	4.1	6.9

September 1941, increased with age, varying from 41.6 per cent for men born in 1919 to 86.5 per cent for men born in 1904.

Rejection rates for all causes have been somewhat higher for Negroes than whites. For example, in the period between April 1942, and March 1943, rejections per 100 men examined at local boards and induction stations were 36.9 for whites and 56.0 for Negroes (4). The data (Table 1) indicate a rate higher among whites than Negroes for the following defects: eyes, ears, teeth, tuberculosis, hernia, mental disease, neurological defects, musculo-skeletal, endocrine, weight and others. The rejection rate is higher among Negroes for the following defects: cardiovascular, genitalia, syphilis, other venereal diseases, mental deficiency, educational, feet.

In the case of tuberculosis, disagreement exists between various published series of data as to the relative rate in whites and Negroes. In an earlier publication (3) of the Selective Service System, rejection rates at local boards were 7.3 per 1,000 whites examined at local boards and 3.6 per 1,000 Negroes. Rowntree (5) reported a rejection rate for men 18-19 years of age of 6.6 per 1,000 whites examined and 9.7 per 1,000 Negroes. Karpinos (6) for young men between 18 and 38 years found a rate of positive cases of tuberculosis of 12 per 1,000 for whites and 15 per 1,000 for Negroes. Adjusted for males 18-39, 1940 United States Census, the rates become 19 per 1,000 for whites and 20 per 1,000 for Negroes. The results are summarized in Table 2.

Table 2. Comparison of rejection rates because of tuberculosis for white and negro registrants.

SERIES	REJECTIONS PER 1,000 MEN EXAMINED		
	White and Negro	White	Negro
Selective Service (3)	6.9	7.3	3.6
Selective Service (4)	14.6	15.2	11.1
Rowntree (5)	6.8	6.6	9.7
Karpinos (6)	12.0	12.0	15.0

The data appear to indicate that the prevalence of tuberculosis among living Negroes is not far different from that among whites. In view of the higher mortality among Negroes, this would seem to mean a shorter duration in Negro cases prior to death than in whites or lower case fatality, or a combination of the two. These factors are obviously partly related and partly independent of each other in their effect on the prevalence in the population of living persons having the disease.

Rowntree gives rejection rates by broad occupational groups (Table 3) which show highest rejection rates among farmers and emergency and unemployed workers and lowest rates among professional, supervisory, craftsmen, clerical and kindred workers.

Dr. Ciocco (7) and other workers in the Public Health Service have used the data which we have collected at Hagerstown over the past twenty years to make a comparison between the physical status of selectees today and the physical status of those same youths when they were children some fifteen years ago. The findings of that

Table 3. Rejection rates, by broad occupational group, of 18 and 19 year old registrants.

OCCUPATION GROUP	RATE PER HUNDRED EXAMINED		
	White and Negro	White <sup>1</sup>	Negro
All Occupations	25.4	23.8	45.5
Professional and Semiprofessional Workers	20.5	20.5	*
Farmers	41.1	36.4	58.0
Proprietors, Clerical, Sales and Kindred Workers	21.0	20.9	26.9
Craftsmen, Foremen and Kindred Workers	20.4	19.9	39.6
Operatives and Kindred Workers	22.2	21.6	39.6
Service Workers	28.9	25.8	35.9
Laborers Except Farm and Mine	28.2	25.3	46.0
Emergency Workers and Unemployed	37.7	37.2	44.9
Students	23.3	23.0	31.6

<sup>1</sup> Includes all races other than Negro.

\* Insufficient data for calculation of rate.

study indicate that many of the physical defects responsible for the rejection of men by Selective Service today were evident in their incipency when these young men were children. A relatively large number of the selectees who have been rejected for defective teeth and vision, for example, already gave evidence of these same defects when they were in elementary school. Many cardiovascular and hearing defects responsible for rejection could also have been detected in childhood. Furthermore, the interesting fact was shown that underweight and poor nutritional status and bad posture were much more frequent among children rejected for military service fifteen years later than among children who were later accepted for military service.

For example, the number of decayed, missing or filled teeth per 100 children was twice as high among those children later rejected by draft board physicians as among those placed in Class 1-A. Low visual acuity at school examinations fifteen years ago was found in 49 per cent of the selectees who were later disqualified because of vision as compared with only 5 per cent among the men placed in Class 1-A.

The rejection rate for young men who had been found to have poor nutrition or posture during childhood was 50 per cent higher than among young men who had good nutrition and posture as children.

Underweight children fifteen years ago grew up to be young men of whom 60 per cent failed to meet Selective Service standards as compared with 45 per cent rejections among those whose weight had been normal during childhood.

The immediate reaction, based on the exigencies of the moment, has been to consider the rehabilitation of men found defective. However, it would seem that it is appropriate to inquire into the possibility of preventing the conditions which lead to disqualification of men as soldiers. Military health requirements spring from the need for men who can function efficiently under arduous cir-

cumstances, and perhaps for civilian life such requirements may seem stringent and unnecessary. But it would appear beneficial to adjust our standards of civilian good health so that such requirements at least will be met more frequently in the future than they are now.

The need for competent, healthy, physically-fit young men and women is now and is going to be for years to come at an all-time high, so that the Hagerstown data would seem to be of more than academic interest since they show that we have had for years an effective way of predicting long in advance the physical status of adults of the new particularly important productive ages.

Since the time of the Civil War, the high proportion of physical defects found among young men being examined for military service has been viewed with alarm. The only result observable in eighty years, however, has been a number of papers by medical statisticians. It is to be hoped that the present results may draw the attention of others than statisticians and serve to promote the planning of more adequate health services for children and adolescents so that young men and women of future generations may achieve a maximum level of good health.

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## RECENT FINDINGS ON NUTRITIONAL STATUS OF INDUSTRIAL WORKERS

DOROTHY G. WIEHL<sup>1</sup>

THE health problems of the population have been discussed by the previous speakers in terms of the incidence and prevalence of disease and impairments. Another phase of health is the sense of well-being, vigor, and vitality which may be materially impaired by subnormal nutrition. Furthermore, malnutrition itself produces pathological changes which, even though they do not progress to the stage of being the direct cause of disabling illness, are a factor in the occurrence of disease. The nutritional status of industrial workers, therefore, is now receiving attention as an important aspect of the health of this group.

Prior to the war there was no organized effort to promote the nutritional status of the industrial worker. Management, and medical departments where they existed, considered the eating habits of the worker and even arrangements for obtaining food to be the personal business of the worker. If special eating facilities had to be provided, concessions for serving food usually were given on a purely commercial basis and there was no supervision of the kinds and quality of food. But manpower requirements for war production focused attention on maintaining the health, efficiency, and morale of the industrial worker and good nutrition was recognized as a primary means to this end. In November 1940, the Food and Nutrition Board of the National Research Council established a Committee on Nutrition of Industrial Workers. This Committee has conducted or sponsored special studies to determine: (a) the quality of diets eaten by industrial workers; (b) the nutritional status of industrial workers; and (c) the improvements and changes needed in feeding facilities to make proper food easily obtainable.

An extensive investigation of the diets and nutritional status of

<sup>1</sup> Milbank Memorial Fund.

about 1,100 aircraft workers at the Lockheed plant in Burbank, California, was conducted from late in November 1941 to March 1942 (1,2). The Study was under the direction of Dr. Henry Borsook with assistance from the Los Angeles County Committee on Nutrition in Industry and the Milbank Memorial Fund. The Lockheed plant had already undergone rapid expansion and approximately 60 per cent (61.6) of the employees in the Study had been employed there less than one year. But only 7.5 per cent had been employed less than three months. The Company had taken no responsibility for the eating facilities, and employees either brought their food with them or purchased it at one of the many food stands which lined the streets near the factory gates. Most of these food vendors sold only such foods as sandwiches, cake, fruit, milk, coffee, and soft drinks. The few restaurants equipped to sell hot meals could serve only a small proportion of the employees. Later, there was some improvement in the availability of hot foods which were brought in paper cartons from kitchens some distance from the plant and sold at the food stands.

The employees in the Study were nearly all young men; 88 per cent were under 35 years of age. All were on the swing shift, that is, they worked from 4 o'clock to midnight. Therefore, their hours for eating were not "normal." Most of the men had a late morning breakfast and a complete hot dinner before going to work at 4 o'clock. Consequently, the swing shift employees were unlikely to begin work on an empty stomach as do many day workers who have little breakfast. Their eating habits were highly variable; some ate very little at the midshift meal period; the majority ate something after work before going to bed and this varied from a light snack to a full dinner; and many ate no breakfast. Thus, the men ate two, three, or four times in twenty-four hours.

The calories estimated for two-day diet histories reported by 250 men averaged about 2,700 calories per day. In every case the employee had been at work on both days. This average is 10 per cent

less than the 3,000 calories per day usually recommended for the average man engaged at moderate activity. Actually, there is, of course, considerable variation among individuals in calorie needs and also the day-to-day consumption of any person will vary. On the basis of age, height and weight, the basal calorie requirements of these men were estimated, but it was not possible to estimate total individual energy expenditures. With even light work, the calorie requirement would be not less than 140 per cent of basal, and the recommended 3,000 calories for men working eight hours at moderate work is about 175 per cent of basal need. Among this group, 39 per cent of the men consumed diets which furnished less than the 140 per cent and only 26 per cent had diets furnishing 180 per cent or more of their estimated basal need.

Obviously, it is not possible on the basis of a two-day diet to select the men who were averaging too low a calorie intake nor to determine exactly how many had insufficient calories. Eighteen per cent of the group weighed 10 per cent or more less than the expected or standard weight for height, and it has been shown (3) that men who are underweight have higher than average mortality rates and also a greater prevalence of some health defects, such as nervousness, frequent colds, and gastric disturbances. Even though they were not losing weight, it seems likely that some of these men would benefit by a greater intake of calories and some increase in weight. The tendency to consume less calories than is deemed desirable has been shown by other studies in which individual consumption records were obtained for employed adult men. There is need of further investigation of optimum caloric intake for industrial workers. Much factory work does not require a great amount of muscular exertion and the standard 3,000 calories may well be too high. On the other hand, an equilibrium may be established between weight and intake at a level which is less than optimum for the individual.

As might be expected, low-calorie diets are frequently associated with the failure to eat a good breakfast. In this group of 250 men,

18 per cent of them had no breakfast on either of the two days, and about 12 per cent had no breakfast on one of the days. Only 36 per cent of the group ate breakfasts which averaged 500 or more calories

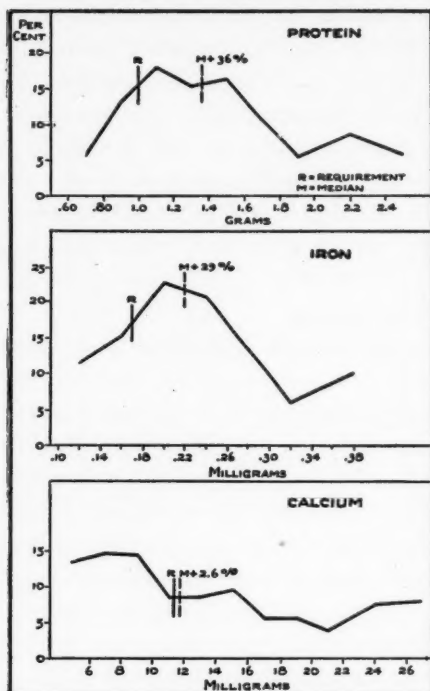


Fig. 1. Percentage distributions of the average daily amount of protein, iron, and calcium per kilogram of body weight in two-day diets reported by 250 Lockheed aircraft workers.

ers. Turley (4) found that 11 per cent of 552 West Coast industrial workers ate no breakfast and 53 per cent had breakfasts furnishing less than 300 calories. In a survey of 189 workers in Ithaca, New York, in the summer of 1943, Diehl (5) found that 14 per cent ate no breakfast or only coffee or tea, and the average breakfast furnished about 300 calories or one-tenth of the total daily caloric allowance.

daily, and 13.6 per cent had 750 or more calories or one-fourth of the daily allowance. Among those with no breakfast or less than 250 calories (88 men), 39 per cent averaged a total daily caloric intake of less than 2,200 calories, and 24 per cent had 3,000 or more calories; but when the breakfast furnished 500 or more calories (91 men), 18 per cent averaged a total caloric intake of less than 2,200 calories and one-half averaged 3,000 or more calories. Other studies have shown that no breakfast or a very light breakfast is a common failing of diets of work-

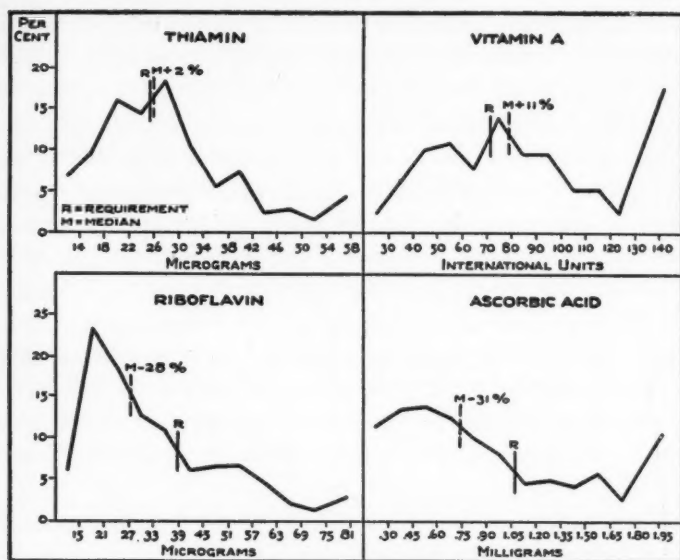


Fig. 2. Percentage distributions of the average daily amount of thiamin, riboflavin, vitamin A, and ascorbic acid per kilogram of body weight in two-day diets reported by 250 Lockheed aircraft workers.

For each of the 250 two-day diet histories, the amounts of protein, iron, calcium, thiamin, riboflavin, ascorbic acid, and vitamin A were estimated. Assay values for vitamin content of cooked foods were used when available; and estimates of losses of thiamin and ascorbic acid were made for other cooked vegetables; and of thiamin and riboflavin in cooked meats. The estimated total daily intake of any nutrient, especially of the vitamins, is only a good approximation, but if most of the diets were of the type to furnish close to the recommended amount of a nutrient, the values would be fairly evenly distributed about a central or mean value nearly equal to the recommended allowance. The percentage distributions of values for individual diets per kilogram of body weight for protein, iron, and calcium are shown in Figure 1; and distributions for vitamin A, thiamin, riboflavin, and ascorbic acid are shown in Figure 2. The

point on each distribution at which the recommended value<sup>2</sup> falls is shown and the median value of the distribution also is indicated.

For protein and iron, the diets are distributed well above the recommended values, and the medians are 36 per cent and 29 per cent, respectively, higher than the requirement. For calcium, the distribution is entirely different. The median value is very slightly above the recommended (2.6 per cent), but the frequency curve does not center around this point. There is a concentration of diets at a level below the calcium allowance and the upper 50 per cent of the diets spread out over a wide range with a considerable proportion at a level double the allowance. In the case of protein and iron, it seems likely that the few low values for the two-day period are accidental and unusual and that few, if any, of the men average a significantly low intake of these nutrients. The frequency of very low calcium values, on the other hand, suggests that diets with low calcium content are not unusual and that a considerable number of these men averaged a low intake not only during the two-day period but also over a longer period.

For ascorbic acid, the distribution curve is somewhat similar in shape to that for calcium, but the median value for ascorbic acid is 33 per cent less than the recommended amount. The greatest frequency for ascorbic acid values is at about one-half the requirement level.

The distribution of diets for vitamin A content is relatively flat and has no definite tendency for the frequency to concentrate near the median which is slightly higher (11 per cent) than the recommended allowance. Values are spread over a wide range, and this reflects the extreme variation in vitamin A values for different foods. From day to day, the dietary level for the same individual can easily shift from one end of the distribution to the other, depending largely on the carotene content of vegetables eaten. A two-day record is

<sup>2</sup> Recommended value per kg. of body weight for each nutrient is the allowance for an adult man recommended by the National Research Council (6) divided by 70, or the weight in kilograms of an average man.

particularly inadequate for judging the dietary intake of vitamin A.

The distribution of dietary values for thiamin tends to center around the requirement level, and the median value is approximately equal to the suggested requirement. There is a considerable range in thiamin values. For riboflavin, the median intake is 28 per cent less than the recommended amount and the maximum concentration of values is at the lowest end of the curve, well below the median value.

The allowances for thiamin and riboflavin are based on a ratio of .6 mg. and .9 mg., respectively, per 1,000 calories.

Since the caloric intake for the majority of the men was less than 3,000 calories, the intake of thiamin and riboflavin sometimes equaled the allowance per 1,000 calories although it was less than the suggested total requirement. The distributions of diets according to thiamin and riboflavin values per 1,000 calories are shown in Figure 3. The median intake for thiamin is .69 mg., or 15 per cent above the suggested .60 mg. But for riboflavin, the median value is .75 mg. or 17 per cent less than the allowance of .9 mg. The frequency and degree of deficiencies of both are less in terms of the amount per 1,000 calories than in total amount, but riboflavin is still one of the most frequent deficiencies, second only to ascorbic acid.

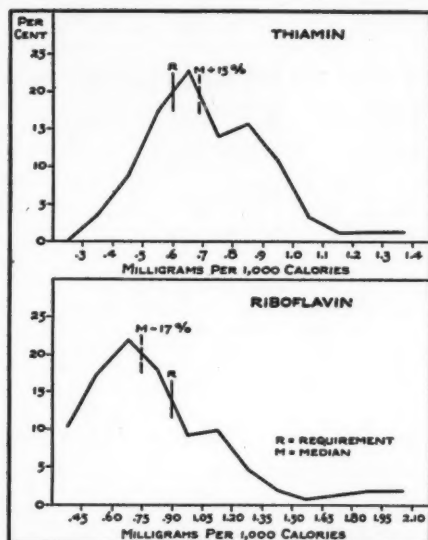


Fig. 3. Percentage distributions of the thiamin and riboflavin per 1,000 calories in two-day diets reported by 250 Lockheed aircraft workers.



In Figure 4, a summary comparison of the different nutrients is shown in terms of the proportions of the diets which furnished less than two-thirds of the recommended allowances. Ascorbic acid and

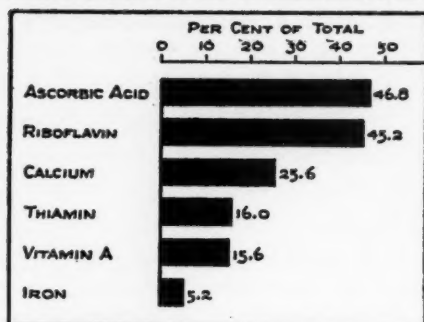


Fig. 4. Percentages of 250 Lockheed aircraft workers who reported two-day diets which furnished less than two-thirds of the recommended allowances per kilogram of weight for six nutrients.

riboflavin values were most frequently low, and 47 and 45 per cent of the diets furnished less than two-thirds of the allowances for these nutrients. Calcium was next with 26 per cent of the diets below the two-thirds level.

Only 7.6 per cent of these diets met the recommended allowances

for both calcium and iron and for the four vitamins. In 71 per cent of the diets, one or more of these six nutrients was less than two-thirds of allowances, and in 42 per cent, two or more nutrients were below this level.

It is obvious that few men were obtaining balanced diets, and the variety of deficiencies and the frequency of multiple deficiencies indicate that this lack of balance in the diets was due to a generally poor choice of foods.

For about 1,100 men, the use of various foods during an entire week was tabulated. Five groups of foods may be considered which are the most important sources of the minerals and vitamins. These are: (1) the green or yellow vegetables; (2) citrus fruits and tomatoes; (3) milk; (4) meat; and (5) eggs. Cereal foods make an important contribution to the minerals and B vitamins, but they are present to some extent in all diets, and enriched bread was in general supply at the time of this Study. For the usual or average American diet, a citrus fruit or tomato, one green or yellow vege-



table, two glasses of milk, a serving of meat, and one egg each day will supply enough of each of the nutrients so that the remainder of the food does not need to be carefully chosen. But the omission of one of these foods, with the exception of eggs, imposes a need for expertly planned substitutes.

In this group of 1,100 employes, only 2.1 per cent or 23 men, reported the consumption during one week of an average daily use of these five types of food equal to or slightly below the standard stated. By food groups, the percentages of the men eating for one week approximately according to the desirable pattern were as follows:

	<i>Per Cent</i>
Green or yellow vegetable, 6 x or more	21
Citrus fruit or tomato, 7 x or more	36
Milk, 10 or more glasses	51
Eggs, 4 or more	59
Lean meat, fish, etc., 5 x or more	95

It is interesting to note the extent of the failure of this group of men to include these essential foods in their diets. One-third of the group had eaten vegetables of any type (excluding potatoes) less than an average of once a day, and one-fourth (24 per cent) of them had eaten green or yellow vegetables less than three times during the week. No citrus fruit in the entire week was reported by 23 per cent of the men and 17 per cent had had only one or two servings in a week. Nearly one-half of the men had no tomatoes or tomato juice during an entire week. Other fruits were eaten more regularly and 73 per cent of the men had had some kind of fruit at least seven times in the week, but only one-fourth had eaten fruit an average of twice a day as is recommended. Apples and bananas were eaten most often. About 37 per cent of the men reported less than seven glasses of milk during the entire week and 11 per cent had drunk no milk and had had none on cereal.

The infrequent use of citrus fruits and green vegetables accounts

for the low ascorbic acid content of the two-day diets; the low consumption of milk is the primary factor in the low riboflavin and calcium values of the diets.

Comparable data on the eating habits of industrial workers in other parts of the country and of those on the daytime shift are not available. But there is a large amount of evidence from family studies and other surveys to indicate that the dietary pattern of these aircraft workers is in general similar to that of most adults in the United States. Although the choice of foods varies somewhat for different groups, an inadequate consumption of green and yellow vegetables, citrus fruits, and milk is the usual finding. Data from a recent study in Baltimore (7) may be used as one example from the East. From about 950 families, records were obtained on the use of various foods during a one-week period in January or February 1943. In about 60 per cent of these families, one or more persons was employed in a war industry. Proportions of families with low ratings for the use of four types of foods are compared with those for the Lockheed workers in Table 1. The record for the families is somewhat better than that for the Lockheed group, but 42 per cent of these families and 64 per cent of the Lockheed group had a green vegetable less than five times in a week; about one-fourth of the families and one-half of the Lockheed men had citrus fruits or tomatoes less than six times; and one-fourth of the families and one-half of the men had used less than 2.5 quarts of milk per person. It

Table 1. Proportions of Lockheed employees and of Baltimore families for which use of selected foods was unsatisfactory.

WEEKLY USE OF SPECIFIED FOODS	LOCKHEED (1,103 MEN)	BALTIMORE (318 FAMILIES) <sup>1</sup>
	Per Cent	
Vegetables, Green or Yellow: 4 x or Less	64	42
Citrus Fruit and Tomatoes: 5 x or Less	56	22
Milk (Per Person): 9 Glasses or Less	49	27
Meat: 3 x or Less	2.3	3.8

<sup>1</sup> Wife under 40 years of age.

is very probable, of course, that many men in the Baltimore families had less than a per capita share of the milk, and it is also likely that they did not always eat citrus fruit, which may be purchased especially for the children. But it is apparent that in Baltimore, as well as California, diets frequently failed to include sufficient amounts of milk, citrus fruit, and green vegetables.

The nutritional status of this group of Lockheed employees was investigated by physical examination; examination of the blood for hemoglobin and plasma ascorbic acid; and biomicroscopic examination of the conjunctiva and cornea. The findings have been reported in detail by Borsook, Alpert, and Keighley (2). The results of the examination confirm the dietary evidence and all of the men showed manifestations of one or more deficiencies in some degree. There is time to refer briefly to a few of the findings. Only two men in the group had moderately severe anemia, but 11 per cent had hemoglobin values less than 13.4 grams, which is subnormal by any of the standards. Some degree of conjunctival thickening associated with vitamin A deficiency was found for all, and one-half of the men had elevated areas or "spots" visible by gross examination. Changes in the conjunctiva limited to marked translucency of all four zones of the eyes were found for only 2 per cent of the men. Similarly, every employee examined showed some degree of corneal vascularization, an indication of high prevalence of ariboflavinosis. In 42 per cent of the subjects, long "streamer type" arcades were reported, and in an additional 46 per cent, there were three or more tiers of capillary arcades in the cornea. These conjunctival and corneal conditions may reflect past or long-standing deficiencies of vitamin A and riboflavin, respectively, and once acquired they are not easily removed by diet alone. Thus, the current diet of the men was not necessarily a factor in producing these conditions. Many of the men were consuming a diet currently which would not improve their condition and would, in fact, keep it active. A large proportion of the men complained of eye symp-

toms: 35 per cent had burning, itchy, or gritty feeling in the eyes; 25 per cent complained of eye strain; 43 per cent stated they were uncomfortable in a bright light; and 23 per cent reported that a bright light caused lachrymation.

The examination revealed no cases of acute, severe polyneuropathy, but 25 per cent had one or more signs of degeneration of the nervous system which may indicate thiamin deficiency, although they are not specific.

The plasma ascorbic acid values for these Lockheed employees revealed that plasma values below desirable levels were very common. The precise level at which good ascorbic acid nutrition is maintained is not known, but it is generally admitted that values below 0.60 mg. per cent are not "safe." Plasma values below .60 mg. were found for 52 per cent of the group, and one-third of the men had plasma values below .40 mg. per cent. A low intake of ascorbic acid is reflected promptly in the concentration of ascorbic acid in the blood, and these findings for plasma ascorbic acid are in agreement with the dietary data on the use of citrus fruits and other foods rich in ascorbic acid.

Table 2. The frequency with which citrus fruits or tomatoes were consumed during one week by Lockheed employees who had various plasma ascorbic acid values.

PLASMA ASCORBIC ACID MG. PER CENT	TOTAL NUMBER OF MEN	PER CENT IN EACH PLASMA GROUP WHO REPORTED USING CITRUS FRUITS OR TOMATOES SPECIFIED TIMES PER WEEK <sup>1</sup>						
		Total	None	1-2	3-4	5-6	7-8	9+
TOTAL	1,092	100.0	17.5	19.1	18.1	15.8	16.8	12.6
<.20	114	100.0	35.5	29.8	21.0	9.7	4.0	0
.20-.39	241	100.0	25.3	28.6	22.0	12.0	10.4	1.7
.40-.59	216	100.0	24.1	20.8	19.4	16.2	10.6	8.8
.60-.79	193	100.0	10.9	18.1	16.1	19.2	22.8	13.0
.80-.99	148	100.0	5.4	10.1	17.6	20.9	28.4	17.6
1.00+	170	100.0	2.9	4.7	11.8	17.1	25.9	37.6

<sup>1</sup> See footnote 3.

It is of interest to compare individual plasma ascorbic acid values with the reported use of citrus fruits and tomatoes for the week preceding the examination. Although the reports on use of these fruits is not quantitative,<sup>\*</sup> it is apparent in Table 2 that the relationship is marked. In the group of 124 men with less than .20 mg. ascorbic acid per 100 ml. of plasma, 35 per cent had had no citrus fruits or tomatoes, 30 per cent had had only one or two servings in a week, and only 4 per cent had had seven servings. There is a progressive increase in the use of these foods as plasma ascorbic acid increases. Among the 170 men with plasma values of 1.0 mg. or more, 64 per cent had had seven or more servings of citrus fruits or tomatoes and 8 per cent had had less than three servings. Very few of the men maintained satisfactory plasma ascorbic acid values without the regular use of tomatoes or citrus fruits.

The high prevalence of nutritional deficiencies in this industrial group is in conformity with other evidence that is gradually being accumulated from examinations on various population groups, such as school children, hospital and clinic patients, and family surveys. These data have been compiled and published recently in a Bulletin of the National Research Council (8). It is sufficient here to point out that every survey has disclosed a high prevalence of deficiencies. These are not severe, acute nutritional diseases, but mild, moderate, or, in some cases, severe chronic forms of the deficiencies. The health significance of these deficiency conditions is discussed in the Bulletin (8). Most people are quite unaware of them and there is some tendency to discount their importance. Data on their relationship to disease, lack of vitality, fatigue, nervousness, and various complaints are available from a limited number of studies. Animal experiments, especially the work of Sherman (9), have shown that optimum nutrition increases vitality, fertility, and length of life;

<sup>\*</sup> For five days of the week the report was only a statement on the kinds of fruit eaten each day and for the other two days there was a record for each meal. The total in Table 2 is the sum of the number of different citrus fruits or tomatoes mentioned for each day or for each meal, counting tomatoes as one-half a citrus fruit.

and other studies have shown that moderate chronic deficiency over a prolonged period produces unmistakable signs of tissue damage, symptoms of degenerative conditions, and early senility. Studies on humans of the role of malnutrition in disease, ill health, efficiency, work output, etc. are difficult and time-consuming. The need for them is great and undoubtedly their number will increase. Present knowledge, however, affords an adequate basis for acceptance of the premise that a well-nourished employee is a better industrial risk than one in a subnormal nutritional state. The known prevalence of deficiency conditions and the evidence on poor dietary habits give emphasis to the need for an intensified effort to improve the nutritional status of the industrial worker.

In the past two years much has been done to promote public interest in nutrition and to educate the public and home-makers in proper eating. There are national and state agencies and local committees for promotion of nutrition in industry. Dr. Goodhart will tell us about these programs and the progress that is being made.

Among communities and different industrial plants, the problems connected with improving the diets of workers will vary. A properly qualified person should study each situation to determine the special needs and to plan accordingly. Adequate cafeteria service may be available, but the workers may not select good, well-balanced lunches. Such a situation may be due solely to ignorance and food prejudices, but price may be a factor or the appearance or tastiness of some of the more nutritious dishes. Methods of influencing the worker's choice of food must be tried and experience with various methods should be reported for the benefit of others. If in-plant food service is provided, expert planning is required to furnish proper food at low cost and to cook and serve it with a minimum loss of valuable nutrients. Most often, especially in the war plants, food service is totally inadequate. Turlay (4) reported that in seven San Francisco shipyards employing 176,000 workers, less than 9 per cent could obtain any kind of food within the yards. This affects

not only the midshift meal but may eliminate the possibility of obtaining between-meal snacks. The between-meal supplement is recommended as a means of preventing fatigue. In most instances, it should be available within the plant. With imagination and intelligent planning, trained dietitians can devise a variety of highly nutritious supplements for between-meal snacks and as additions to the box lunch.

Box lunches are not necessarily any less nutritious than a hot meal; but as a rule they satisfy hunger but do not supply a fair share of the day's vitamin and mineral needs. The home-packed lunch box is very common. In Baltimore, Miss Downes (7) found that in 884 families with one or more employed persons, 69 per cent of them had one or more members who took lunch from home. In Ithaca, Diehl (5) found that 59 per cent of 189 workers carried lunch from home. But in newly mushroomed war industries, the majority of workers are likely to buy box lunches from vendors. At a San Francisco shipyard, Turlay found that 85 per cent of the employees purchased box lunches. An analysis of 90 box lunches showed that they were "moderately to grossly inadequate since thiamin, vitamin A, riboflavin, calcium, and protein values were low."

Obviously, there is no easy or single method to improve the nutrition of industrial workers. Education of the worker and of the wives is important, but management can play an important role in improving the eating habits of its employees. As it is to the advantage of industry to have well-nourished workers, management should take an active part in working out methods to assure adequate feeding facilities, should supervise the quality of food dispensed, and cooperate in educational programs and other means for influencing the dietary habits of the workers.

A diagnostic service for nutritional deficiencies in industrial medical departments offers a direct, individual approach which holds great potentialities for raising the nutritional status of workers.



Many workers have moderate or well-advanced chronic deficiency conditions which should be corrected. If these conditions are described and interpreted to the employe, and treatment for their correction is undertaken, not only are the more definite nutritional problems cared for but also an interest may be stimulated in diet and maintenance of good nutrition. In addition, knowledge of the prevalence of specific nutritional deficiencies in the group would furnish guidance on the importance of emphasizing special nutrients in in-plant feeding and in the educational program. Furthermore, specific occupational groups could be studied over a period of time for changes in nutritional status. Workers in certain occupations may tend to develop specific deficiencies, and the occupational factors involved and the prevention of such deficiencies should receive special attention.

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## THE DEMOGRAPHIC POSITION OF EGYPT<sup>1</sup>

CLYDE V. KISER

WITH a population of about sixteen and a half million, Egypt may seem to be relatively unimportant in world population problems. It is true that from the standpoint of size Egypt is not one of the critical areas such as India or China. On the other hand, the population problems of Egypt epitomize in some respects those of the vast Mohammedan world and particularly for that reason are worthy of study. Although the demographic data for Egypt are far from ideal, they are much more adequate than those for some of the other countries in which similar problems exist on a much wider scale.

The political boundaries of Egypt include about 386,100 square miles (1,000,000 square kilometers), but over 95 per cent of this area is barren desert. The country has aptly been described as a vast desert pierced by the Nile. The desert and the Nile not only describe the physical characteristics but also set the pattern of population distribution. Of the 15,932,694 persons reported by the 1937 Census, over 99 per cent lived in the delta and in the narrow and sharply defined strip of fertile land bordering the Nile, although the delta and the valley contain only 13,198 square miles, or less than 4 per cent of the area within Egypt's political boundaries.

Thus, as in Biblical times, the real Egypt of today is the Egypt of the Nile. Hemmed in by the desert and virtually without rainfall, the country is vitally dependent on the yearly flood of silt-laden water. Sir William Willcocks has said, "Egypt is nothing more than the deposit left by the Nile in flood . . . Cut off this supply for a single season and the entire population of Egypt would be in the grip of famine; curtail it to any serious extent for a few years, and the strip of cultivation would disappear."<sup>2</sup>

<sup>1</sup> A preliminary report on a study being made under the auspices of the Office of Population Research, Princeton University, with the cooperation of the Milbank Memorial Fund.

<sup>2</sup> Low, Sidney: *EGYPT IN TRANSITION*. New York, The Macmillan Company, 1914, p. 133.

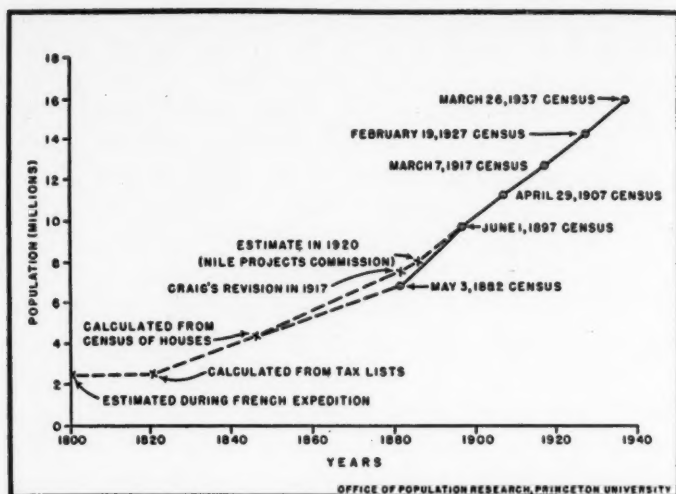


Fig. 1. Population growth in Egypt as indicated by census figures and earlier estimates.

*Growth of Population.* The published data concerning Egypt's population growth since 1800 are charted in Figure 1. We will not be concerned here with Egypt's population during ancient or medieval times. Suffice it to state that whereas estimates extend from three to twenty-four million, some of the modern scholars doubt the population of ancient or medieval Egypt ever exceeded seven or eight million.

There is also uncertainty concerning the size of Egypt's population during the early part of the nineteenth century when the country, after centuries of obscurity, was flung into the current of world affairs first by the short-lived conquest of Napoleon and later by the reign of the Albanian conqueror, Mohamed Ali. The estimate of two and a half million for 1800, made during the French expedition, and the slightly higher estimate for 1821, made on the basis of tax lists, may seem somewhat low in view of the considerably higher estimates for ancient and medieval times. They

may also seem low in relation to the estimate of 4.5 million for 1846, calculated from a census of houses. On the other hand, there is hardly any doubt that the population of Egypt had been larger than it was at the beginning of the nineteenth century. In explanation, Cleland has stated that "some centuries of misrule, exploitation, and civil strife under the Mameluke chieftains had greatly decimated the population and wasted the country's wealth."<sup>3</sup> Other writers have stated that under the Mamelukes large areas of previously cultivated land were allowed to revert to desert and salt marsh. Students of the problem have generally agreed that a new cycle of population growth in Egypt began during the reign of Mohamed Ali (1805-1848). They mention the irrigation works, improved sanitation, and stabilization of government as well as considerable immigration during the early years. Nevertheless, it is quite possible that the early estimates of population were too low and that the growth from 1821 to 1846 was not so great as that indicated by the population estimates for those years.

Whatever that situation may have been, there is no doubt about the rapid increase of population in more recent times. The population has more than doubled since 1882, the year of the first census of Egypt in modern times.<sup>4</sup> This has meant a serious increase in population density owing to the relatively inelastic amount of cultivable land available.<sup>5</sup> In 1882, there were 562 persons per square mile (217 per square kilometer); in 1937 there were 1,198 (463 per square kilometer).<sup>6</sup>

<sup>3</sup> Cleland, Wendell: *THE POPULATION PROBLEM IN EGYPT*. Lancaster, Pennsylvania, The Science Press Printing Company, 1936, p. 6.

<sup>4</sup> This statement holds true even on the basis of the upward revision of the population for 1882. Approximately 6.8 million persons were counted in the 1882 Census. In 1917, J. I. Craig, former Controller of the Egyptian Statistical Department, estimated that the population of 1882 was probably about 7.55 million, or about 11 per cent above the number enumerated. In line with this estimate is one concerning the 1886 population, made in 1920 by the Nile Projects Commission. See Figure 1.

<sup>5</sup> According to the Nile Projects Commission, whereas the population of Egypt increased 76 per cent during 1886-1927, the total cultivable area increased 11 per cent, and the crop area increased 30 per cent. See Cleland, *op. cit.*, p. 34.

<sup>6</sup> In line with Egyptian Census practice, the figures on density relate to Egypt exclusive  
(Continued on page 387)

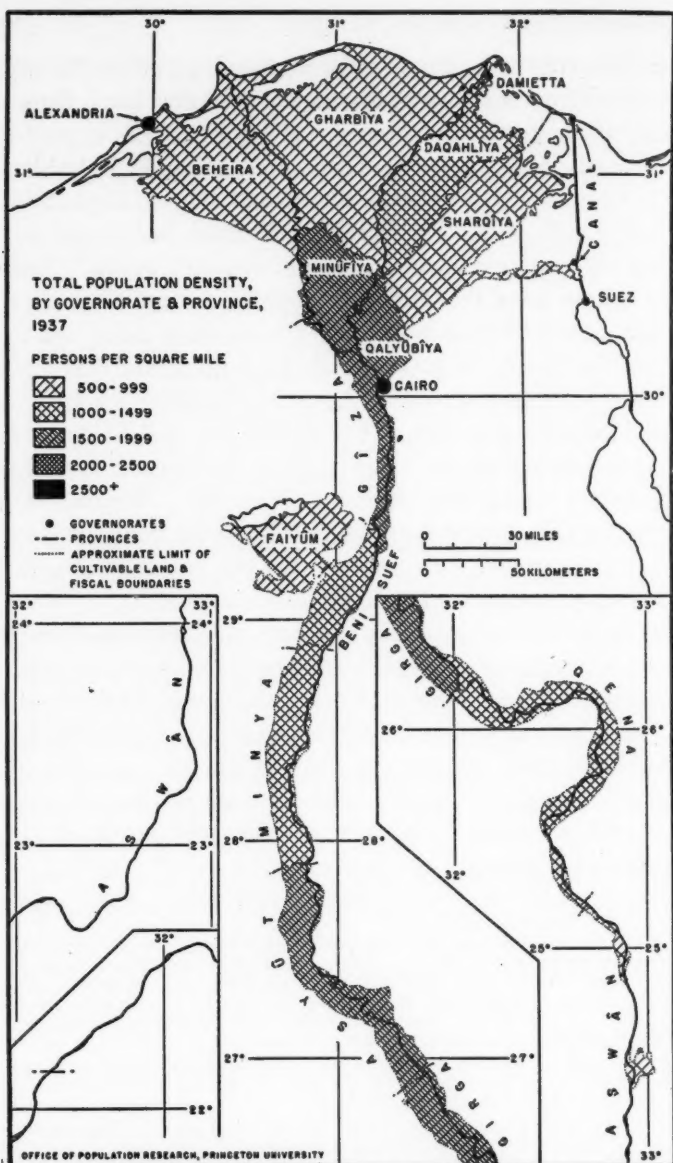


Fig. 2. Number of persons per square mile, by governorate and province. Egypt exclusive of frontier districts, 1937.

The densities by governorate and province are shown in Figure 2. The number of persons per square mile in each of the five governorates is indicated in the chart simply as 2,500 and over. This category conceals wide differences, since the density ranges from 2,751 in Suez to 45,416 in Damietta. (The latter, however, had an area of only nine-tenths of a square mile in 1937 and a population of 40,332.) For two important governorates, Cairo and Alexandria, the persons per square mile were 20,609 and 24,364, respectively. The governorates, being mainly urban,<sup>7</sup> are more densely populated than the provinces. However, although each of the fourteen provinces is predominantly rural, five of them contained 500-999 persons per square mile, four were in the 1,000-1,499 range, and five were over 1,500. Two of these, Minûfiya and Girga, had about 1,885 persons per square mile in 1937. Also relatively high were Qalyûbiya and Gîza, just north and south of Cairo, respectively. The relatively low average densities of the three large provinces in the delta (Beheira, Gharbîya, and Sharqîya) are doubtless due in large measure to the extensive areas of salt marsh and other unreclaimed land within the fiscal boundaries of those provinces.

With an average of about 1,200 persons per square mile, occupied Egypt is one of the most densely settled countries in the world. Furthermore, Egypt is preeminently an agricultural country, and yet the density of its occupied area is higher than that of heavily industrialized England, and higher than that of Belgium, the most thickly settled country of continental Europe.

Even on the basis of persons dependent on agriculture per square of frontier districts. More specifically, the area and population considered are those of the combined governorates and provinces, or essentially those of the delta and valley (see Figure 2). The computed density for 1882 (217 per square kilometer) was based upon Craig's upward revision of the population reduced by an estimated number of inhabitants of frontier districts. The 1937 Census, using the enumerated population of 1882, gives a population density of only 195 per square kilometer for the earlier year.

<sup>7</sup> The five governorates are separate political and territorial entities. All are specific cities except Canal, which embraces two cities, Port Said and Ismalia, together with a relatively small amount of rural population. This separate treatment of governorates is forced by nature of the data and does not result in a clear-cut rural-urban differentiation of the population. There remain the provincial capitals as well as other towns within the provinces.

mile of agricultural land, the average figures are 1,094 for total Egypt, 970 for Lower Egypt (the delta), and 1,270 for Upper Egypt (the valley).<sup>\*</sup> The lower average density in the delta than in the valley quite possibly is due in some measure to the greater prevalence of waste land in that area despite the attempt at restriction to agricultural land. At all events, to find problems of density of population that are on a par with those of Egypt, one must go to areas such as Java, China, and the Ganges Valley.

*Nativity and Religion.* The rapid growth and increasing density occurs in an extraordinarily homogeneous population. In the 1937 Census, 99 per cent of the inhabitants of Egypt were recorded as native. In fact, 92 per cent were born in the province or governorate of residence.

By religion, 91.4 per cent of the population were Mohammedans in 1937, 8.2 per cent were Christians, and 0.4 per cent were Jewish. The Christians were mainly "Copts," adherents of the old Coptic Church of Egypt. The "Copts" comprised 6.9 per cent of the total population, Catholics comprised 0.8 per cent, and Protestants 0.5 per cent.

The Mohammedans predominate in all areas of Egypt. In no governorate or province did they comprise less than three-fourths of the population in 1937. The lowest proportionate importance was found in Alexandria where it was 77 per cent. The proportion was 81 per cent in Cairo. Even in the so-called Coptic capital of Egypt, the province of Asyût in Upper Egypt, Mohammedans comprised 78 per cent of the population.

*Rurality.* The population is mainly rural. It should be stated at the outset, however, that the rural-urban dichotomy is not so clear-

<sup>\*</sup>The above figures on density of the agricultural population are to be regarded as only approximate. The acreage of agricultural land in 1929 was obtained for Lower and Upper Egypt from International Institute of Agriculture: *THE FIRST WORLD AGRICULTURAL CENSUS* (1930), Rome, 1939, Vol. V, p. 177. From 1937 Census data it was possible to secure the per cent of occupied males in agriculture. These figures were converted to per cent of total population dependent on agriculture by application of a regression equation based upon direct data for these two variables obtained from 1927 Census data for selected provinces in Turkey.

cut and meaningful in Egypt as in our own country. There is little in the way of open spaces and isolated farm homes in the habitable land of Egypt. Even the agricultural families live compactly. On the other hand, of course, there are definitely cities and urban communities. According to computations from the 1939 VITAL STATISTICS, only about 27 per cent of the people of Egypt resided in towns of 10,000 and over;<sup>\*</sup> about 73 per cent were in rural or village areas. By province, wherein the governorates are excluded, rural or village population extended from 79 to 90 per cent.

For indications of trends in urbanization, we must resort to census figures concerning proportions of persons in rather large cities, the governorates and provincial capitals. These figures indicate that, although there has been no striking increase in the proportion living in these cities since 1897, the increase was somewhat greater for the governorates (populations dominated by Cairo and Alexandria) than for the smaller provincial capitals. The governorates contained 10.3 per cent of Egypt's population in 1897 and 14.1 per cent in 1937. The provincial capitals contained 4.0 per cent in 1897 and 4.4 per cent in 1937.

*Illiteracy.* Illiteracy is a common characteristic. In 1937, about 85 per cent of the population 10 years of age and over were unable to read and write. The lowest percentages were found for Cairo and Alexandria, but even in these cities, they were 60 and 62, respectively. In the provinces and frontier districts, the percentages illiterate extended from 79 to 93. By sex, the percentages illiterate were 77 for males and 94 for females.

Even among the literate population, very few have the equivalent

<sup>\*</sup> Although included with "towns" for the above computations, some of the localities of 10,000-24,999 were in fact villages in the administrative sense in that they were governed by village councils as distinguished from municipal, mixed, and local commissions. On the basis of number of inhabitants of places definitely designated as "urban towns" in the 1939 VITAL STATISTICS, only about 24 per cent of Egypt's population was "urban" in that year. (See Egyptian Government, Ministry of Finance, Statistical Department: VITAL STATISTICS, 1939. Cairo, Government Press, 1941. Table III, pp. 30-59.) Some students regard as essentially urban only the governorates and provincial capitals, which collectively contained only 18.5 per cent of Egypt's population in 1937.



of a high school education. According to computations made from the 1937 Census, less than 1 per cent of the total population 20 years of age and over held the equivalent of a high school diploma.

School attendance, however, has increased greatly in recent years. In 1927 there were only about sixteen pupils attending school for each one hundred children 5-14 years of age. By 1937, this ratio had doubled. The greatest proportionate increases were in the most illiterate provinces and among girl students of elementary schools. Male students of elementary schools increased by about 38 per cent over the decade but the number of female students more than trebled. In 1927-1928, about one-fifth of the elementary students were girls but in 1936-1937 over one-third were girls.

*Livelihood.* Being largely rural, Egypt is preeminently agricultural. In 1937, 68 per cent of the occupied males were directly engaged in agriculture and the computed proportion of the total population directly dependent on agriculture was 63 per cent. There was virtually no change in the proportion dependent on agriculture over the 1927-1937 decade.

The outstanding cash crop is cotton, which normally accounts for 80-90 per cent of the value of exports and, the production of which usually occupies about one-third of the cultivated area and slightly over one-fifth of the crop area. Other important crops are maize, millet, wheat, and clover.

With respect to land ownership, Egypt can be described as a place where the majority of the agricultural families own a bit of land but most of the land is owned by a small minority. Of 2.5 million proprietors of land listed in 1938, approximately 70 per cent owned less than one feddan each (1.03 acres) and they collectively owned only 12 per cent of the cultivated land. Proprietors of one to five feddans comprised an additional 23 per cent of the owners and they owned 20 per cent of the land. In other words, 93 per cent of the owners owned less than five feddans each and they



collectively owned only 32 per cent of the land. The remaining 7 per cent of the owners owned 68 per cent of the land. Proprietors of fifty feddans (51.9 acres) and over comprised only one-half of 1 per cent of the owners, but they owned about 38 per cent of the cultivated land.<sup>10</sup>

According to Cleland, the 7 per cent of the landholders who own over two-thirds of the land are for the most part "the rich, the educated, the big land corporations and the officials, in other words, all the influential persons who manage the affairs of the nation. As a very large number of these owners simply let their lands at fixed rentals and spend their days in the cities, they pay little attention to the methods of the fellaheen and take no interest in anything except to collect the rents."<sup>11</sup>

As expected from the small size of the holdings, the bulk of the peasants live at virtually subsistence levels. The families owning less than one acre generally rent a little more land, but owing to high rents, inefficient methods of work, poor state of the public health, and sheer lack of land available, the average family of five rarely undertakes to cultivate more than two or three acres, and, according to Cleland, this means a gross family income of about \$250 per year. Owners or renters of smaller parcels get along on less. The income may be supplemented somewhat by part-time employment on a cotton plantation or in a town or village but at best the situation adds up to poverty.

*Vital Statistics.* The rapid increase of Egypt's population has been due almost altogether to natural increase, for immigration in modern times has been negligible. The vital statistics document an enormous human wastage in this increase, for death rates are still appallingly high by Western standards.

In view of the illiterate state of the population and other factors it is not surprising that the registration of births and deaths is far

<sup>10</sup> Egyptian Government, Ministry of Finance, Statistical Department: *ANNUAIRE STATISTIQUE*, 1938-1939. Cairo, Government Press, 1940. pp. 322-323.

<sup>11</sup> Cleland, *op. cit.*, p. 95.

from ideal in Egypt.<sup>29</sup> In some localities the registration is in the hands of barbers and tax collectors. Fortunately, however, some basis for estimating the extent of non-reporting of births and deaths is afforded by the vital rates given separately for chief cities (governorates and provincial capitals) and for Health Bureau areas which include not only the chief cities but also increasing numbers of rural villages. In 1939, the Health Bureau areas included almost one-third of the total population of Egypt.

Even the recorded rates for total Egypt, including all of the poorly registered areas, give the essential story of very high levels of fertility, mortality, and infant mortality. In 1939, the recorded rates for total Egypt were 42.2 births and 26.0 deaths per 1,000 population; and 161 infant deaths per 1,000 live births. The rates based on the more adequate registration in Health Bureau areas were: birth rate, 46.8; death rate, 29.7; and infant mortality rate, 198.<sup>30</sup>

The following are average rates for Health Bureau populations:

AREA	BIRTH	DEATH	INFANT MORTALITY
Governorates	43.9	25.2	191
Provinces, Lower Egypt	48.6	32.0	184
Provinces, Upper Egypt	49.7	35.1	224

<sup>29</sup> A few words may also be said regarding the accuracy of the census. As already stated, the first attempt at a modern census was made in 1882 and the total number enumerated in that census should have been about 11 per cent higher, according to a later estimate by a Census official. Later censuses have been much more accurate but undoubtedly the census still fails to enumerate all the people for there is unmistakable evidence of substantial under-enumeration of children. The under-enumeration of children under 5 in the 1937 Census may have been as high as 25 per cent.

Probably the worst deficiency of the census, however, arises from ignorance of the people concerning their ages. Single-year age distributions of the 1927 Census data reveal very high concentrations on ages divisible by five.

To generalize the situation, the taking of the Egyptian census is organized to yield a virtually complete enumeration of households but it falls down with respect to coverage of children and with respect to accuracy of age. Civil servants are drafted for the task of enumeration and this has the advantage of permanence of organization with lines of authority and personnel extending down to the smallest village and territorial division. The deficiencies of the census can be understood when it is realized that all but a small proportion of the people are illiterate and have only the roughest notion of their ages. Also, as a result of the cloistered position of Moslem women, census enumerators generally secure their information for the total household from the male head.

<sup>30</sup> By governorate and province, the birth rates for Health Bureau areas extended from (Continued on page 393)

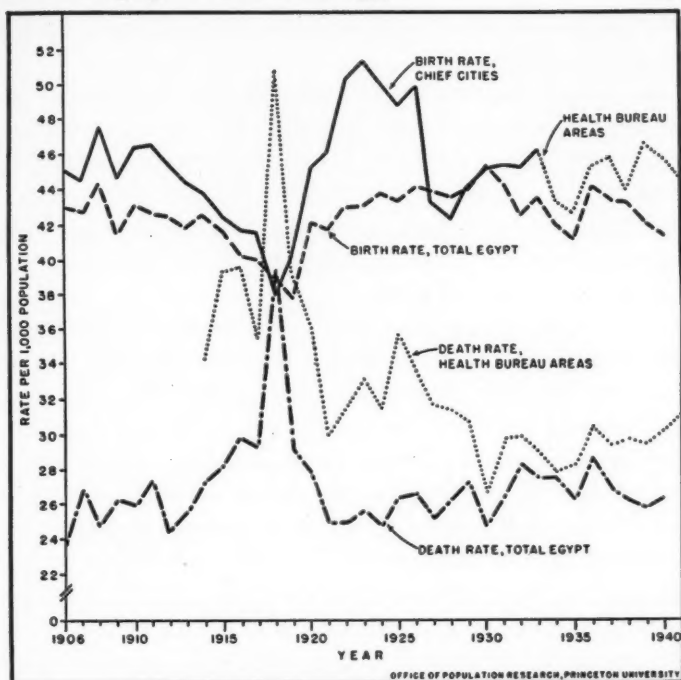


Fig. 3. Birth and death rates reported for total Egypt 1906-1940 and rates available separately for the better-registered chief cities and Health Bureau areas.

The comparison of the data for total Egypt with those for the Health Bureau areas suggests that the birth rates for the former for 1939 should be about 11 per cent higher, the death rates about 14 per cent higher, and the infant mortality rates about 23 per cent higher. The Health Bureau areas themselves are very probably not models of complete registration and their constituencies may not be representative of the total population. It is therefore necessary to emphasize that all vital rates presented in this report, regardless of

38.5 in Aswân to 54.1 in Suez. The former was the only rate under 40 and there were five provinces with rates of 50 or more. The death rates extended from 22.5 in Damietta to 43.4 in Faiyûm. The high rate for Faiyûm was approached by two other provinces. Infant mortality rates extended from 149 in Damietta to 273 in Faiyûm.

whether they are actual or derived data, must be regarded at best as approximations.

It is difficult to draw conclusions regarding trends in fertility and mortality rates during the past 35 or 40 years. Figure 3 depicts these rates for total Egypt since 1906. It also shows available data for the chief cities and Health Bureau areas. The fluctuations of both birth and death rates, seen even in the data for the presumably better registered areas, are conspicuous in this chart, for the vertical scale is broken to start at a rate of 22.

Over the long span of years since 1906, however, the data at their face value afford little indication of decline in the birth rate. At least some improvement in registration has doubtless taken place, however, and this factor might easily conceal an actual decrease. Fertility ratios computed from census data since 1907 do show a decline. According to those data the decline was largest during the first decade and was due to changes in proportions married as well as to declines in marital fertility. The number of children under 5 per 1,000 women 15-49 years of age declined 15 per cent from 1907 to 1917, remained the same until 1927, and declined 5 per cent from 1927 to 1937. The marital fertility ratio, children under 5 per 1,000 married women 15-49, declined 10 per cent from 1907 to 1917, remained virtually the same to 1927, and declined 4 per cent from 1927 to 1937. It should be stated, however, that there is some evidence that the enumeration of children under 5 years of age was less thorough in 1937 than in 1927; so the indicated decrease during that decade may be at least partially spurious.

CENSUS YEAR	CHILDREN UNDER 5 PER 1,000 WOMEN 15-49	
	All Women	Married Women
1907	681	859
1917	580	772
1927	578	781
1937	547	750

With regard to death rates it is practically certain that a substantial drop has occurred at least since the early part of the last century, when the population was almost at a standstill. Carr-Saunders attributes some of the early phenomenal growth to immigration but he and others presume much higher death rates in Egypt during the first half of the nineteenth century than at present and this is in line with the virtual eradication of such diseases as plague and cholera.

As to the trend of the recorded mortality rates for total Egypt since 1906 and for Health Bureau areas since 1914, shown in Figure 3, several points may be noted. The high peak in 1918, of course, is due to the influenza pandemic. The recorded data for total Egypt show no improvement in mortality conditions since 1906 but improvements in registration doubtless weigh heavily in this series of data. The Health Bureau series indicate substantially lower levels of mortality for years after 1920 than for the several years preceding the influenza epidemic. They also suggest an upward secular trend during 1930-1941. It is possible that spurious factors are involved in the apparent increase during this period. Whatever this situation may have been, there are reports of serious increases in mortality since 1941 owing to malaria and typhus. Official data on these recent developments are not yet available.

Infant mortality rates are shown in Figure 4 for total Egypt during 1919-1940 and for Health Bureau areas during 1906-1941. The rates for Health Bureau areas show a very marked decline during the period under consideration. In the early part of the period the rates were well above 300; since 1930 they have been around 200. The general decline was steepest during the period 1906-1921, rather slight from 1921 to 1930, and practically nonexistent since 1930, although in 1939 the recorded rate for Health Bureau areas fell below 200 for the first time.

For a country like Egypt it is important to learn the nature and extent of existing variations in fertility and mortality, so that there may be some basis for judging the prospect for declines in these

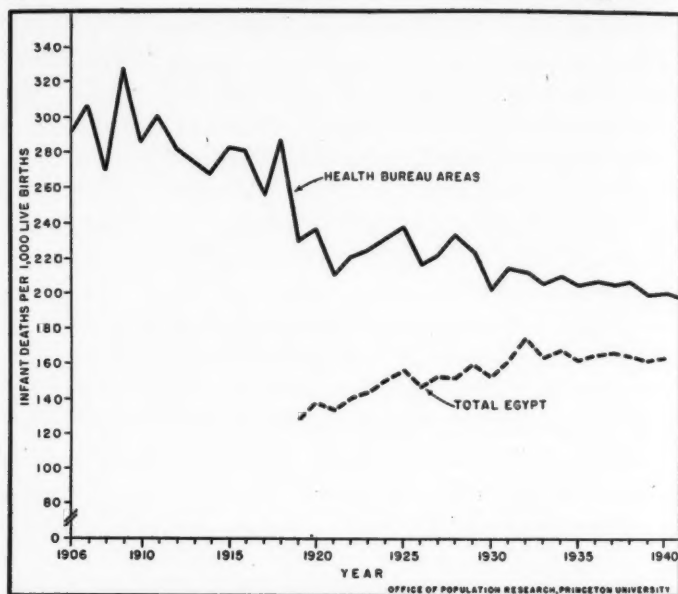


Fig. 4. Infant mortality rates reported for total Egypt 1919-1940 and for the better registered Health Bureau areas 1906-1941.

rates. Unfortunately, the data permit exploration along only a few channels such as those by type of community, area, and religion.

In Figure 5, the birth, death, and infant mortality rates are shown by size of community for total Egypt and for Lower Egypt and Upper Egypt separately. The vital rates are those of 1939 for populations in Health Bureau areas.<sup>24</sup> This restriction to Health Bureau areas is believed to remove most, but not all, of the differences in adequacy of registration. The "Total Urban" categories include all Health Bureau towns and cities of 10,000 and over. The "Rural and Village" classes comprise the remaining Health Bureau areas. In Upper Egypt the rates for the "Total Urban" areas are higher than the rural rates but this the writer believes to arise from better regis-

<sup>24</sup> The data used in computing the rates were derived from Egyptian Government, Ministry of Finance, Statistical Department: *VITAL STATISTICS, 1939*. Cairo, Government Press, 1941, Table III, pp. 30-59.

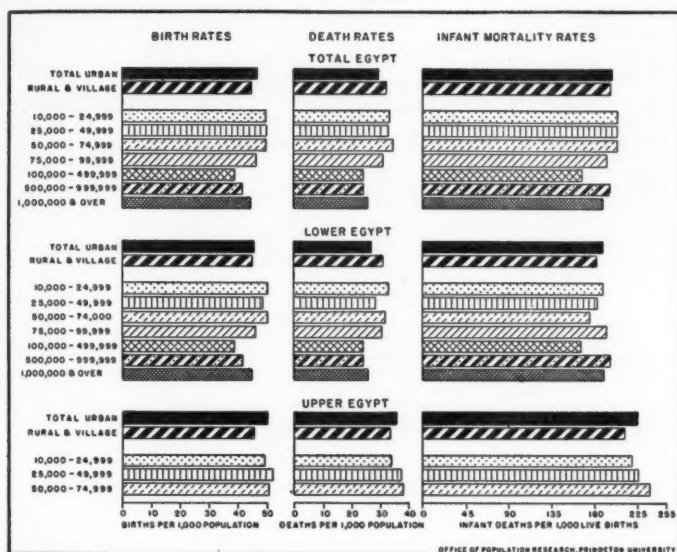


Fig. 5. Birth, death, and infant mortality rates in Health Bureau areas of Egypt, by region and type of community, 1939.

tration. In Lower Egypt the average urban rates are pulled down by virtue of the influence of large cities.<sup>28</sup> To generalize the situation, there appears to be no substantial rural-urban differential in fertility and mortality except in so far as the largest cities are concerned. More will be said below about the large cities but attention is called here to the appearance of somewhat higher death and infant mortality rates in Upper Egypt than in Lower Egypt when size of city is held constant. There is not much difference between those two regional divisions with respect to birth rates in cities of comparable size.

The fertility differentials by religion are wide, especially in the largest cities. In total Egypt (not restricted to Health Bureau areas) the birth rate in 1939 was 43 for Moslems, 34 for Christians, and 21

<sup>28</sup> Only one city is represented in each of the three categories for cities of 100,000 and over. The three listed in the order of increasing size are Port Said, Alexandria, and Cairo.



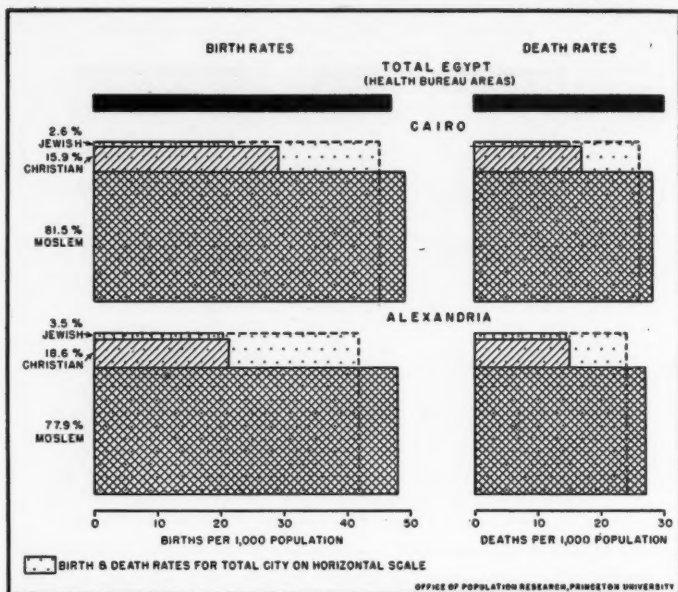


Fig. 6. Birth and death rates for Jews, Christians, and Mohammedans in Cairo and Alexandria in 1939, shown in relation to proportionate importance of these groups and in comparison with rates for Total Egypt (Health Bureau areas).

for Jews. In bringing the metropolitan and religious influences together, as in Figure 6, we find the interesting suggestion that the relatively low birth rates of the two largest cities are due in considerable measure to the influence of the non-Moslem elements in those cities. In this chart, as a basis for comparison, the birth and death rates of Health Bureau populations in total Egypt are shown by the solid black bar. Lower than these are the rates for the populations of Cairo and Alexandria, both of which are Health Bureau areas. The vertical axis for each of these two cities simply indicates the proportionate importance of the three religious groups. For instance, in Cairo the Moslems comprised about 81 per cent of the population, the Christians 16 per cent, and the Jews 3 per cent. A virtually similar composition by religion is found in Alexandria. The chief



point of interest is that the minority of non-Moslems seems to be responsible for the lower birth rates in these two cities than in total Egypt. In Cairo the birth rates were 49 for Moslems, 29 for Christians, and 22 for Jews. In Alexandria the birth differentials were essentially of this same pattern.

There is a slightly different picture with respect to death rates, for in both cities the Moslems exhibited somewhat lower rates than the average rate for all Health Bureau areas in Egypt. The death rates in Cairo were 28 for Moslems, 17 for Christians, and 15 for Jews. A rigorous analysis of the religious and metropolitan influences would demand control of age and other factors but on the basis of present materials there is the suggestion that the fertility patterns of Moslems in Egypt have not yet been much affected by urban ways even in the largest cities.

*Life Tables for Egypt (1927-1937)*. The heavy toll of mortality in Egypt may be described in terms of life-table functions computed for the period 1927-1937 by the "census differencing" method. This was used because reliable age-specific mortality rates are not available from registration data.

The underlying theory of the "census differencing" method is simple. If a country has neither gains nor losses through migration, and if the age data are accurate, persons reported as, say, 20 years of age in 1937 may be regarded as the survivors of those reported as 10 years of age in 1927. Hence, for any given age in 1927 the probability of living or dying during ten years can be readily computed.

The first requisite for the application of this method, that of virtual absence of immigration or emigration, is easily met in so far as Egypt is concerned. The second requirement, accurate age data, is far from fulfilled by the census materials. The first task, therefore, was that of smoothing the age distributions. This was done by fitting Pearson's Type IX Curve<sup>20</sup> to the data. This device was

<sup>20</sup> The slope of Pearson's Type IX is described by the formula  $y = y_0 (a-x)^m$ .

Note that the  $y$  values derived by this formula are the ordinates computed for specific

(Continued on page 400)

formerly used by El-Shanawany<sup>27</sup> in his construction of life tables for Egypt for the 1917-1927 decade by the census differencing method. One departure from El-Shanawany's procedure, however, was that of making certain preliminary adjustments of the census data before fitting the smoothed curves. Some correction for under-enumeration of children under 5 was made and a little was done in the way of arbitrary but systematic redistribution of population in other age groups in order to reduce some of the more prominent irregularities.<sup>28</sup> The extent of all preliminary adjustments of the 1937 Census is illustrated in Figure 7.

The first step in the life-table construction, that of computing the probabilities of dying within ten years, was done by staggering the ordinate values of the smoothed curve for 1927 ten years in age behind the 1937 ordinates, deriving the differences at selected ages and dividing by the 1927 ordinate values. It was necessary, however, to reconstruct the " $q_x$ " values for ages under 10, for the originally computed probabilities of death at these ages were inordinately

ages for use in the census differencing method. An integral form of the equation was used for computing the populations within five-year age groups, plotted in Figure 7.

<sup>27</sup> El-Shanawany, M. R.: *The First National Life Tables for Egypt. L'Egypte Contemporaine*, March, 1936, No. 162, pp. 209-269.

<sup>28</sup> This consisted chiefly in systematically consigning given proportions of persons reporting ages divisible by five to the preceding five-year age group. Single-year age distributions of the 1927 Census population provided by El-Shanawany indicated marked concentrations on ages that were multiples of five. This type of concentration was stronger on even than on odd multiples of five, so some of the serrations persisted in the five-year groupings. Toward the end of partial correction for this the following operations were carried through for the males and females for 1927 and 1937. (Single-year age distributions were not available for 1937, but they were estimated by applying the percentage distribution by single year of age within each five-year age group in 1927.)

- 0-4 No change except adjustment for under-enumeration
- 5-9 Census figure plus one-fourth of age 10
- 10-14 Census figure less one-fourth of age 10 plus one-half of age 15
- 15-19 Census figure less one-half of age 15 plus one-half of age 20
- 20-24 Census figure less one-half of age 20 plus one-half of age 25, etc.

The above adjustments were sufficient to remove the serrations in the census data above age 50, but a few additional redistributions were included in the preliminary adjustments of younger ages. These were made in order to reduce the trough and cusp characteristics within the 15-40 age range. This step seemed desirable since examination of census distributions for preceding dates attested to the unreality of these characteristics and it was thought that partial correction preliminary to smoothing would yield truer slopes of the smoothed age curves. The adjustment of this type for males was a little different from that for females but for each sex group the adjustment for the two census years was the same.

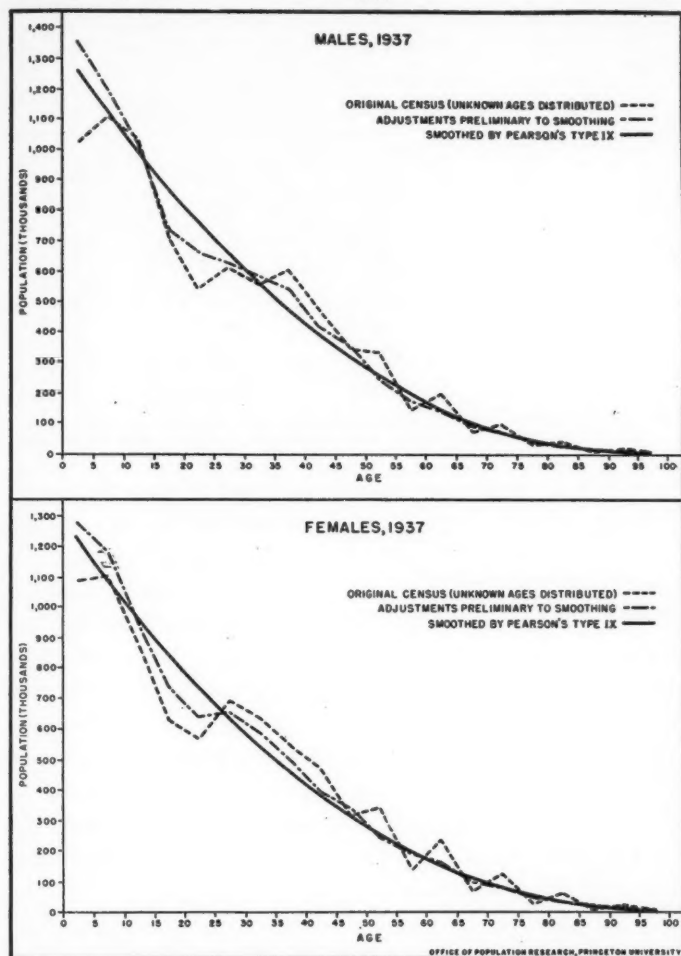


Fig. 7. Five-year age distributions as reported in the 1937 Census of Egypt, as adjusted preliminary to smoothing, and as smoothed according to Pearson's Type IX.

low.<sup>19</sup> As a basis for reconstruction, the infant mortality rates for

<sup>19</sup>El-Shanawany also encountered unsatisfactory results for ages under 10. His recourse was that of placing the radix of his 1917-1927 life tables at age 10.

(Continued on page 402)

AGE	NUMBER OF SURVIVORS ( $l_x$ )		COMPLETE EXPECTATION OF LIFE IN YEARS ( $e^o_x$ )	
	Males	Females	Males	Females
0	100,000	100,000	30.2	31.5
1	77,710	79,950	37.7	38.3
5	64,061	67,775	41.5	41.0
10	61,390	65,613	38.2	37.2
20	52,980	55,961	33.5	32.8
30	44,916	46,660	28.6	28.3
40	36,970	37,673	23.7	23.9
50	28,973	29,016	18.8	19.6
60	20,887	20,793	14.2	15.4
70	12,931	13,239	9.9	11.4
80	5,836	6,797	6.2	7.6
90	1,083	2,157	4.3	4.3
100	12	22	—	—

Table 1. Life table survivorship ( $l$ ) and expectation of life ( $e^o_x$ ) at given ages in Egypt, 1927-1937.

Health Bureau areas were expressed in terms of unity for the  $1q_0$  values (probability of dying within the first year of age), and the  $4q_1$  and  $5q_5$  values were computed on the basis of adjusted vital statistics data. Needless to say, no claim is made that the life-table functions computed for Egypt are more than reasonable approximations.

On the basis of our 1927-1937 life table for Egypt, the females have a slight advantage over males in survivorship (Table 1). Among males, only 78 per cent reach one year of age, 64 per cent reach five, 53 per cent reach twenty years of age, and 21 per cent reach sixty. The data for females suggest that about 80 per cent reach their first year of age, 68 per cent reach five, 56 per cent reach twenty, and 21 per cent reach sixty.

The survivorship ( $l_x$ ) data for males are shown in Figure 8 for Egypt and several other countries. Those for India are from life tables constructed by Dr. Kingsley Davis by age-smoothing and

The fundamental difficulty was that the observed differences between  $y$  values for age 0 in 1927 and age 10 in 1937 were too small. This was apparently partly a result of the deficiencies of the original distribution at later ages. Probably as a compensation for gashes in the original curves at certain later ages the smoothed curve tended to fall below the numbers presumed (preliminary adjustments) at ages under 5.

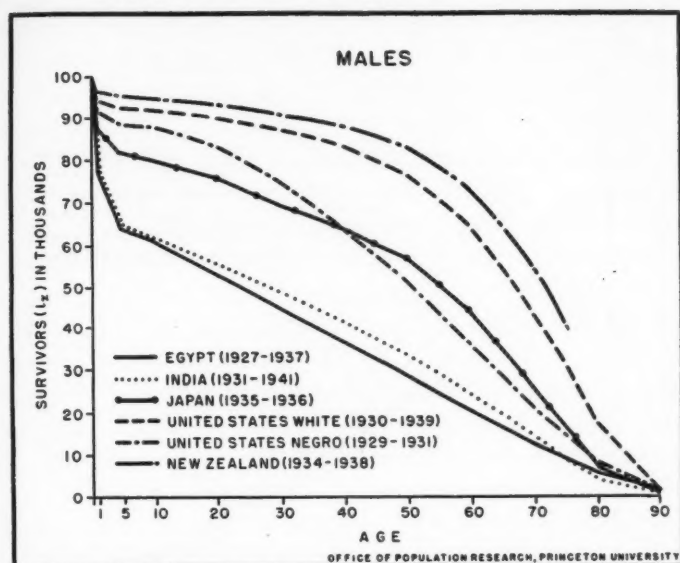


Fig. 8. Survivorship of males ( $l_x$ ) in Egypt and other countries according to life tables of given dates.

census-differencing methods similar to those described for Egypt. Those for other countries are based upon published official data. One of the most striking summary comparisons by country is that of the age by which one-fourth of the original cohort are dead. Thus, one-fourth are dead at 1.8 years of age in Egypt, 2.0 years in India, 51.5 years in the United States (whites) and 58.4 years in New Zealand. In view of the nature of the data, of course, close comparisons of certain countries are not warranted. For instance, similarities of, rather than differences between, the results for Egypt and India should be emphasized. No close examination of the data is needed, however, to document the relatively low status of both Egypt and India with respect to survivorship at all ages under fifty.

The same story, of course, is told by the data on expectation of life at birth and at later ages. Figure 9 affords comparisons for males.

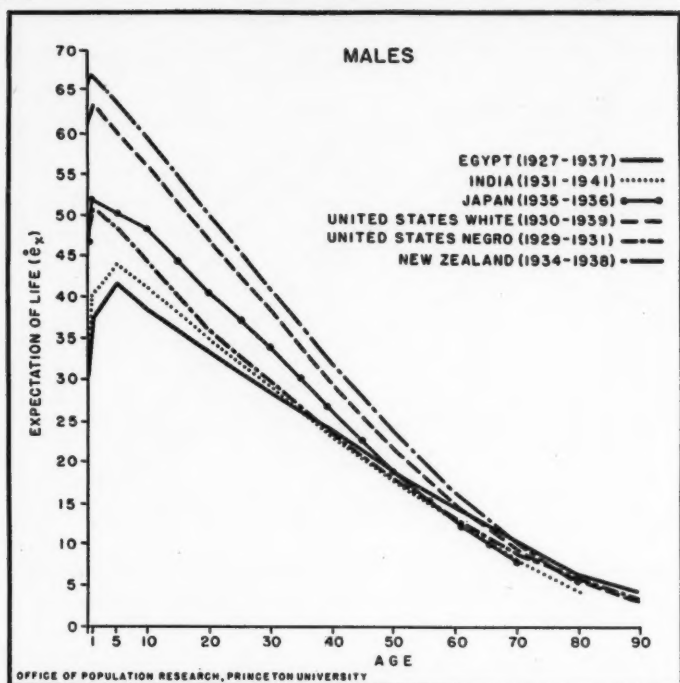


Fig. 9. Expectation of life ( $e_x^0$ ) among males in Egypt and other countries according to life tables of given dates.

The expectation of life at birth is 30.2 in Egypt, 32.1 in India, 60.6 in the United States (whites), and 65.5 in New Zealand. Among females, the expectations of life at birth are 31.5 for Egypt, 31.4 for India, 64.6 for the United States (whites), and 68.5 for New Zealand.

There were too many departures of our procedures from those of El-Shanawany to warrant close comparison of the 1927-1937 data with those of 1917-1927. El-Shanawany began his life tables with age 10 instead of 0.<sup>30</sup> For males at age 10 the life expectancy is about

<sup>30</sup> In his discussion, however, El-Shanawany estimated that during 1917-1927 the expectation of life at age 10 was about 40 years.

(Continued on page 405)

38 years in both sets of material. At later ages the 1927-1937 expectancies remain about one year below the 1917-1927 figures. For females the expectancy at age 10 is lower by about four years in the 1927-1937 than in the 1917-1927 data (37.2 and 41.6, respectively). This type of difference persists in diminishing magnitude to about age 46. At later ages the difference is reversed and the 1917-1927 expectancies are about one year below those of 1927-1937. To generalize, the comparisons fail to indicate that life expectancy was higher in 1927-1937 than in the preceding decade.

*Gross and Net Reproduction Rates.* The high level of the gross and net reproduction rates and the gap between the two emphasize at once the high level of fertility and the appalling force of mortality in Egypt.<sup>21</sup> According to our computations for total Egypt the gross reproduction rate for the year 1937 was 3.11 and the net rate was 1.44. This is an unusual gap between the gross and net rates, but despite the heavy inroads of mortality, continuation of the age-specific fertility and mortality rates of 1937 would ultimately result in an increase of about 44 per cent per generation.

Little in the way of a regional pattern was revealed in the data by province.<sup>22</sup> The two largest cities, Cairo and Alexandria, were substantially below the average for total Egypt with respect to the gross rate of life at birth in Egypt was approximately 31 years for males and 36 for females. The estimate for males was thus about one year higher, and that for females about four years higher, than the expectancies computed for 1927-1937.

<sup>21</sup> It will be recalled that the *gross reproduction rate* indicates the average number of daughters that would be borne per woman among a cohort of females starting life together and surviving the childbearing ages, if given levels of age-specific fertility should continue. The *net reproduction rate* involves allowance for age-specific mortality and states the average number of daughters that would be borne per female in the original cohort under given schedules of age-specific fertility and mortality.

A conventional indirect method was used for computing gross and net reproduction rates for Egypt and its provinces for the years 1932 and 1937, since age-specific fertility rates for Egypt were not available. The age-specific rates for Bulgaria during 1921-1922 were used in the indirect method, since these were found to require only a slight correction factor when applied to Egypt. The Egyptian life table for 1927-1937 was used for conversion from gross to net rates. The reported births for Egypt in 1932 and 1937 were increased 10 per cent as an allowance for under-registration. This over-all allowance was distributed by province largely on the basis of Health Bureau indications of under-registration in 1939.

<sup>22</sup> The lowest gross and net rates computed for 1937 (2.39 and 1.19, respectively) were those for Aswān province in Upper Egypt. The highest gross rate (3.62) was that for Giza in Upper Egypt and the highest net rate (1.80) was that for Damietta governorate.

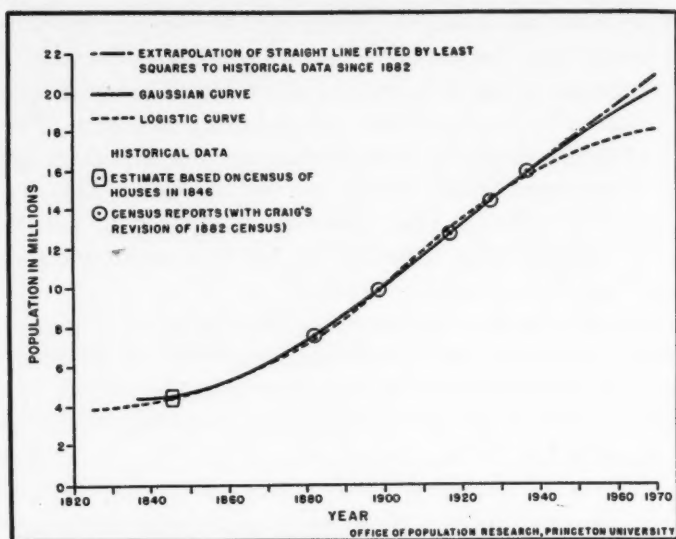


Fig. 10. Projection of Egypt's population to 1970 with three types of growth curves fitted to historical data.

reproduction rate but only a little below with respect to the net reproduction rate. The lower mortality rates tend to compensate the lower fertility rates. Nevertheless, the net reproduction rates of 1.39 for Cairo and Alexandria are high indeed in comparison with those of large cities in Western civilization, which have long been far below the requirements for permanent replacement of the population through births.

The true rate of natural increase, flowing from the computations for the net reproduction rate for total Egypt in 1937, was 12.4 per 1,000 persons per year. The component true birth and death rates were 44.8 and 32.4, respectively. The reproduction rates computed for the year 1932 (G.R.R. 3.03; N.R.R. 1.40) were virtually the same as those for 1937.

*Population Projections.* Consideration of the net reproduction rates and intrinsic rates of increase leads to questions regarding the



prospects for population growth in Egypt. Several types of population projections were carried out, not with the purpose of arriving at a forecast but rather with the purpose of ascertaining the range of results yielded. The straight geometric increase derived by assuming a stable age distribution and continuation of existing levels of age-specific fertility and mortality yielded a population of about 24 million by 1970. This is a 50 per cent increase over the 1937 population and can probably be safely regarded as an outside maximum that will not be attained.

A second projection was that of arithmetic extrapolation. As already noted, the straight line arithmetic increase has in fact been a conspicuous characteristic of the census figures. The fitting of a straight line to the census figures since 1882 by least squares and projection to 1970 yielded a population of about 20.8 million by that year (*see* Figure 10).

Two types of growth curves have been fitted to the data on the assumption of declining rates of increase. A modification of the Gaussian curve<sup>23</sup> suggested a population of about 20.1 million in 1970. A symmetrical form of the logistic curve<sup>24</sup> yielded a population of 18.1 million in 1970.

The Gaussian curve was found to fit the census points more closely than the logistic, but it should be emphasized that each of these curves has its own theoretical advantages and rational difficulties. Only the future will tell what the population of Egypt will be in 1970. On the basis of the three projections represented in Figure 10, it seems reasonable to expect that it will be between 18 and 21 million.

To draw together the various types of demographic data, we have

<sup>23</sup> This curve is described by the formula  $y = a \cdot be^{-ct^2}$ , where  $a$  is the upper limit. The writer is indebted to Dr. John von Neumann of the Institute for Advanced Study for his suggestions and help in the application of this formula. He also received helpful advice from Dr. Lowell J. Reed concerning various growth curves.

<sup>24</sup> The symmetrical form of the logistic curve is described by the formula  $y-d = \frac{K}{1+Ce^{-rt}}$ , where  $d$  is the lower asymptote and  $K$  is the difference between the upper and lower asymptotes.

a situation something like this: Within the narrow belt of habitable land of Egypt, there is a closely packed population that has been increasing rapidly despite the heavy toll of mortality. That population is largely Mohammedan and agricultural. It is weighed down by poverty and illiteracy and ridden by parasitic diseases such as hookworm and bilharzia. Although some improvement may be under way, housing and sanitary conditions are still described by writers as deplorable. Some further increase in cultivated land and crop area is possible through further extension of perennial irrigation and through further reclamation of waste land, but the desert imposes sharp limits on this type of expansion. Some further industrialization will doubtless proceed but the lack of fuel and mineral resources is a barrier to substantial progress in this direction.

In short, Egypt is in a demographic jam. With limited room for expansion and no early prospect for substantial decline of fertility, she faces mounting population pressure. Yet, in some respects, her problems are simply accentuations of those confronted by the vast Mohammedan world. Obviously, the implications of these problems are not confined to Egypt nor even to the Moslems. The importance of such a situation of mounting population pressure extends beyond the boundaries of any single country or religious group, for such pressures form a constant threat to world peace.

## A POPULATION PLAN FOR EGYPT

W. WENDELL CLELAND<sup>1</sup>

**D**URING the past decade in Egypt there has been a steadily increasing interest in the population problem and the accompanying social conditions. In the spring of 1937 the Egyptian Medical Association held a series of forums on the subject, and over the next two years the matter was considered top news by the local press. One hopeful development was the creation of the Ministry of Social Welfare in August, 1939, which was to be charged with all such questions. Although certain definite work was undertaken, the outbreak of war in September and the transfer of the Government's energies to problems of defense greatly hindered the new ministry's growth.

A little over a year ago the Royal Society of Political Economy appointed several commissions to study postwar problems as related to Egypt, one being for social reconstruction. This commission has been hard at work. But in the meantime, the flow of events has intervened with its own type of solution through typhus and malaria epidemics and widespread destitution and malnutrition on a scale not experienced for many years past. The net effect of these conditions can not be measured accurately as the vital statistics have been scanty for the past three years.

At a meeting of the Cairo Scientific Society early in 1939, I tried to direct discussion to a plan for attacking the population problem, in the hope of getting some governmental action, at least in the direction of further intensive study. My desire today is to expose to this Round Table the elements of the plan suggested at that time, in the hope that your criticisms will help toward the solution of these problems, which belong not alone to Egypt but also to the whole world.

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Certain sections of this paper have already appeared in *L'Egypte Contemporaine*, Tome XXX, Cairo, 1939, pp. 461-484.

Five important conditions specifically affecting population growth in Egypt may first be considered briefly:

1. *Age Distribution.* Since Dr. Kiser's paper has dealt with several points pertaining to age composition it only remains to remark here that Egypt has a relatively young population. Thus we may expect still further increases in the younger marriageable age groups.

2. *Health.* Malnutrition and endemic diseases are widespread. The diet is deficient and unbalanced and health services are very inadequate. In February of this year, Egypt had 4,012 physicians, 2,297 in the public services and only 1,715 in private practice. This gives an over-all ratio of about one physician per 1,100 persons in the large cities, but only one per 13,000 in the rural areas where over 80 per cent of the people live. The Ministry of Health is aiming at a ratio of one physician per 1,000 of the total population, which may mean eventually 17,000 doctors. As better health services are rendered the death rate should fall, particularly among infants and children. At present, children under 5, although but 14 per cent of the population, account for 65 per cent of the deaths. Furthermore, the burden of chronic illness and the deteriorating effects of the worm diseases on both physical and mental activity make it difficult to arouse the people to any sense of need for social betterment.

3. *Natural Resources.* Egypt's chief resource is her rich black soil, plus a regular supply of fresh water. Father Nile provides annually some 85 to 90 billion cubic meters of water, and the "black land" measures 13,500 square miles, of which about 64 per cent is arable—some 5,500,000 acres, with a possibility of expansion to 7,100,000 acres when certain irrigation works are carried out. Thanks to the irrigation system, the land as a whole yields an average of a crop and a half per acre, so the arable area is really equivalent to 8,500,000 crop acres, and is eventually expandable to 11,430,000 crop acres. Discovery of considerable subterranean water gives hope of increasing arable land in the western desert.

There is some growth in industry from both agricultural and mineral products. Cotton and silk fabrics are being produced, and paper and jute mills are flourishing. There is some fruit preserving and packing. Mineral oil seems to offer rich opportunities, as does glass manufacturing. Iron and other ores, phosphate deposits, and various clays are promising, and with the electrification of the Aswan dam, cheap power and synthetic nitrates should be available. Furthermore, Egypt hopes to become a great junction for air travel, and to be able to exploit her antiquities more than ever before. The excellent climate should also attract vacationists.

4. *Social Standards.* This heading has been used to suggest the general desires and ambitions of the people, as these are manifested in the scale of living, the degree of education, religion, communications, traditions, and recreations. Here we find the values that the peasant considers most worth while. The average dwelling of those who make up more than 90 per cent of the country's inhabitants consists of three small rooms with walls and floors of mud, and a thatched roof, the outer room being the stable, the whole a sort of mud blister on the face of the land. In this hovel the furniture consists of little more than a broken chair or two and a few coarse rugs for sleeping, since bedsteads are rarely found. There may also be two or three cooking utensils and a receptacle (frequently an oil tin) for carrying water. With an expenditure of one or two pounds a month for food, fuel, and clothing, the fellah drags out an existence not much above that of his water buffalo, goats, geese, and chickens, with which he lives in the closest contact. He cultivates a bit of land, either his own or rented, or else sells his services to others for two or three piasters a day.<sup>a</sup> The routine is not very exacting, except at times of irrigation or harvest, and is rather well fitted to people enervated by worm diseases and not too well informed on modern affairs. Of those over 5 years of age, only 19 per cent are

<sup>a</sup> At "normal" exchange rates the Egyptian pound (£ E) is worth about \$5 and the piaster about five cents.

literate, and the percentage actually using their claimed literacy is even smaller. In such circumstances one would not expect to find many ambitious to break away from the restricted environment; and such is indeed the case. The fellah is a fatalist and regards his condition as unchangeable beyond very narrow limits. In view of this situation among the masses, who are poor and ill and ignorant and "contented," as the upper class says, it will be most difficult to create among them desires sufficiently strong to make them struggle to break their social and economic bonds.

5. *International Relations.* Until there is peace, relief from heavy defense costs, and better cooperation, economic and social, among Near Eastern nations and in the world at large, processes of social reform are going to be greatly hampered. Egypt is a victim of circumstances, and until she can get, by international action, economic and political assistance, she will not be able to solve her problems. This point will be elaborated below.

#### A PLAN

In view of Egypt's rapidly increasing numbers, poor health, poverty, low standard of living, and threats from outside, is there any chance at all of formulating a population plan that will gradually improve matters? First of all, I should like to set the goal. Speaking in terms of the Egyptian family, what would we like to see as the minimum standard? Here we must focus our attention on Egypt, for it would not do to borrow too closely the standard of any other country.

In the following plan I see an average family of from three to five children with intelligent, literate parents, living healthy lives in solid, clean houses, very simply furnished, which will belong to well-ordered, sanitary communities, all members having equal opportunities for plenty of clean water, electric light and power, a well-balanced diet with enough protective foods, simple but adequate clothes, steady and sufficient work to bring an income of not

less than £ E. 100 per year, or its equivalent, and also cheaper land and lower rents, with more cooperation among farmers and in industry. The communities would have adequate schools free to all, adults and children, and provision for the use of leisure time in recreation or other constructive activity. There should be good roads between communities and public services with honest administration in the fields of health, irrigation, communications, and justice.

It should be noted that we have left out much that might be regarded as "embellishment," such as old age pensions, unemployment and accident insurance, elaborate institutions for the needy of whatever kind, and luxury features such as parks, museums, and playgrounds.

Let us now estimate probable costs for those items which would be contributed by the State and result in the release of energies for private initiative in a population of 2,500,000 families, or about 12,000,000 people. Why this figure and not the 16,500,000 of today? My answer is that Egypt has at least 4,500,000 too many inhabitants. There are about 3,300,000 families. If agriculture demanded 1,400,000 families (which allows an average of 4 acres to be worked per family) and industry and commerce eventually absorbed 1,000,000, there would still remain some 900,000 families or 4,500,000 persons, without adequate employment.

In public health if the per capita expenditure were to approximate that of New York City in 1943 (but counting only half of the budget for hospitals) the figure would be about \$3.50, or at normal exchange rates 70 piasters, and this would bring the annual cost for 12,000,000 people to £ E. 8,400,000. In education, children of school age, 5 to 14, would number 3,100,000. At £ E. 10 per head, the lowest rate in recent years of any single state in the United States, the total would be £ E. 31,000,000. Then, to rebuild most of the villages, install fresh water and sewage disposal systems, and make a general sanitary clean-up, the total bill according to the late Mahmoud Shaker Ahmed Bey, Under-Secretary of State of the



Ministry of Health, would be £ E. 71,000,000, which, if spread over thirty-five years, would amount annually to about £ E. 2,000,000. Next, to make good roads throughout the land, another £ E. 1,000,000 could be spent each year. The above figures include only the public expenditures that would seem to be necessary to make possible the attainment of our minimum goal, the creation of such a level of living as would enable individuals to begin gathering a little surplus for the supplying of their further needs at their own expense. The total comes to £ E. 42,400,000. In addition to this sum, there would presumably be no less an amount than existed in the prewar budget of 1939 for Government departments other than those mentioned, that is, some £ E. 33,000,000; so that the grand total of annual expenditures for a period of ten or more years would be about £ E. 75,400,000<sup>3</sup>. Indeed, if defense expenditures should continue for some years at an annual figure of £ E. 7,500,000, the total would become £ E. 82,900,000, or two-fifths of the prewar national income. This is undoubtedly a very high figure for such a poor country, representing a cost of nearly £ E. 7.00 per head annually. There might be a little relief by borrowing for the public works, or else drawing on the reserve fund, but it would not reduce annual costs by more than 3 or 4 million pounds at the most.

The crux of our problem is this: how can the wealth of the country be increased enough to produce revenue equal to this expenditure; and at the same time how can the population be reduced to 12,000,000 and held there, so that a balance may be maintained between resources and people?

Three general classes of solution occur to me, and they should all be applied simultaneously: (1) means should be found to increase and conserve the national wealth, (2) outlets should be found for emigrants, and (3) numbers should be kept down.

1. *Increase and Conservation of National Wealth.* Many agencies

<sup>3</sup> The budget for the year 1943-1944, largely due to war conditions, is about £ E. 65,000,000.

are at work on this problem. Not only is private enterprise looking for new ways to make money, but the government itself is giving much attention to the question. As for arable land, various works are in progress to extend irrigation and reclaim waste lands that will eventually bring the arable land up to 7,100,000 acres, an increase of about 30 per cent over the present area. In the matter of the conservation of land I should like to emphasize the necessity of saving and recovering arable land for agriculture. As we have indicated before, more than 90 per cent of Egypt's wealth is in her cultivable land. If that land is going to be used for many purposes not related to its cultivation, such as dwellings, flower gardens, cemeteries, parks, and other more or less luxury uses, then by that much is agriculture going to lose. Canals, roads, and railways are absolutely necessary to the public economy, and the 800,000 acres used for public purposes are not begrudged. But for such matters as luxury, sport, decoration, and burying the dead, greater use should be made of the desert land. Indeed, a great many of the dwellings could just as well be on the desert as on agricultural land, excellent examples of which are Heliopolis and Maadi. There are at present at least 500,000 rich acres used for commercial purposes and private dwellings. A survey should be made to see what savings could be effected in the uses of land, for every acre that is taken from planting takes also the livelihood of one or two fellaheen. When one observes how such cities as Assiut, Giza, and Tanta have spread out over the arable fields during the past twenty years, one wonders what the end is to be.

2. *Emigration.* Where can Egyptians find a suitable environment to which they might migrate? Three regions offer some hope: the Anglo-Egyptian Sudan, Iraq, and perhaps Ethiopia.

The Anglo-Egyptian Sudan has an area of 1,000,000 square miles, two and a half times that of all Egypt, including her deserts; and her population was estimated in 1938 at 6,000,000. Allowing for extensive tracts of desert and swamps, which reduce the habitable

area, there is yet good reason to believe that irrigation engineering can turn millions of acres into productive lands. The relatively small Gezira area of 3,000,000 acres between the Blue and White Niles, equivalent to one-half the cultivable land of Egypt, is already being brought under perennial irrigation by gradual stages. But beyond this lie the great Sudd region and the great bog of the Bahr el-Ghazal on the upper White Nile, now enormous shallow swamps of apparently rich soil, some 62,500 square kilometers in extent, or almost twice the area of cultivated land in Egypt. This region, "owing to its position, its climate and its rainfall, is too valuable to remain forever a marsh. There seems little reason to doubt that in the future it may be a thriving pastoral, agricultural, or timber country."<sup>4</sup> When to this is added 541,000 square kilometers of higher land in the Bahr el-Ghazal Basin, we have a total habitable area of 603,500 square kilometers, or seventeen times the arable area of Egypt. The work of draining the swamps, primarily with a view to conservation of some 12,000 million cubic meters of water lost annually by evaporation, has been under consideration for some years, and will probably be carried out in connection with another Nile dam yet to be built at Lake Albert. As these waters in time become available for Egypt, is it not possible that the reclaimed and thinly populated land might become available for Egyptian settlers?

More distantly situated, but with a remarkable similarity in physical setting, climate, products, and social organization, is the Kingdom of Iraq. With an area of 143,000 square miles, a population estimated at about 4,000,000, and a mean density of 90 per square mile of the cultivated area, this land is evidently in need of more dependable labor. As pointed out in the latest *Encyclopaedia Britannica*, "The development of the system of irrigation is likely to extend the range of the population considerably." Speaking the same language, holding the same customs, cultivating the same

<sup>4</sup> Macdonald, Sir Murdoch: *NILE CONTROL*. Cairo, Government Press, 1920.

crops in the same way, Egyptian immigrants could easily add greatly to the wealth of the nation in both manpower and produce.

Ethiopia has about the same area as Egypt, including her desert, and has a population of about 12,000,000. It is thought that there are great mineral resources, as well as agricultural, and that a much greater population could be sustained to the advantage of the country. The centuries of cultural association between the two countries should facilitate arrangements for immigration of Egyptians.

If the political arrangements could be made, it might be possible to subsidize emigrants who would be acceptable to the Sudan, Iraq, and Ethiopia. With attractive offers of land and aid in getting started, it is conceivable that the more ambitious fellaheen would be willing to take the risk. Furthermore, the benefit to these countries would be enormous, for the land to be distributed in homesteads is now mostly waste and unclaimed by anyone, least of all by the natives of those regions. The unreclaimed areas of the Sudan alone might take a population equal to Egypt's present number and still have a density of less than one-tenth that of Egypt.

3. *Reduction of Births.* In this connection it is important to understand the social attitudes and traditions of the people, particularly as related to children. I have been interested in gathering some information from various quarters as to why people in Egypt want children and why they have so many. The answers may be summarized as follows:

*In General:*

a. It is the will of Allah to have as many children as possible, and any interference with natural processes will bring punishment. That is one reason why so many children die, as a punishment for sinful parents.

b. It is an honor to have a large family and in old age to be in the position of sheikh of a big tribe. Also, in Upper Egypt especially, security lies in numbers, because of village feuds.

c. Children, while still very young, can help in caring for the animals, weeding, removing plant pests, picking cotton, etc.; and the expense of maintaining them is little indeed.

d. Many children, particularly many sons, afford something of an old-age security policy. It will be easier to live in comfort if many are contributing. Because of this attitude, perhaps, it is difficult to persuade Egyptians to migrate. The elders do not want the young to leave home. In consequence, such migration as there is, is largely by families as units.

e. Children are desired early in life because life is short and there must be time to enjoy them while the parents are still young and strong.

*The Woman Wants or Has Children:*

a. To out-do her neighbors. She boasts of her fertility and is especially proud of many sons.

b. To hold her husband, for children are a bond. The fear of divorce is ever present, but the chance of being divorced is greatly reduced with each additional child. For example, of women divorced in 1935, after having been married more than five years, 49.7 per cent had no children, 30.2 per cent had one child, 14.6 per cent two children, 4.6 per cent three, and 0.9 per cent over three. The chances of divorce, therefore, are roughly in inverse relation to the number of children. When a woman has sons she feels secure against both divorce and poverty. Furthermore, a child born within a year after marriage is a proof to the community that the husband loves the wife.

c. To keep her husband's affection, she must attract him sexually and so she develops the art of coquetry. If she can keep her husband's sexual potency at a low level, she feels he is less likely to be attracted by others. Girls are trained in the arts of sex by their mothers and by the conversation of the women generally, and there is even a professional class of women who instruct girls before marriage. There being so little entertainment in the village, the sexual skill of the women is a matter of some importance. On the other hand there are women who tire of childbearing and fear to lose their attractiveness as they rapidly age in appearance. Particularly do they fear having more girls. Consequently, abortion is practiced in secret.

*As For the Man's Attitudes:*

a. He wants sons more than daughters, and demands that his wife produce until there are enough sons.

b. He is proud of his sexual potency, and is ashamed or perhaps even afraid to admit weakness to his wife, lest she suspect him of preferring

some other woman. For this reason, among others, the peasants have sought relief in drugs which they think possess special values as aphrodisiacs.

Several things are apparent from the foregoing: first, children, and especially sons, are a great economic asset in the primitive environment of the peasant class, and if this value of security is not to be lost when births are reduced, something must be substituted for it. Second, the fear of divorce among the women, perhaps often subconscious, leads them to overemphasize sex, the only talent which many of them possess; and when sexual intercourse becomes a daily habit, a high birth rate is inevitable. The abuses of divorce must be removed in one way or another. In Egypt, 25 per cent of the marriages result in divorce. Third, the people are in utter ignorance, especially the women whose literacy is less than 10 per cent, of the many alternative methods of developing into attractive personalities, of using leisure time, and of safeguarding the values of the family.

We have seen that children in large numbers seem to possess an extraordinary social value, or else are a by-product of certain other social values, and to reduce the number of births, it is going to be necessary to change fundamental ideas and customs. Two approaches are possible: the *direct*, in which by legislation and the use of force attempts are made to modify age-old customs in a short time and bring quick results; and the *indirect*, in which situations are provided that will gradually develop in the people a spontaneous desire for smaller families. In my opinion, a reduction of births will be achieved only in direct ratio to the indirectness of the plan.

One must begin by getting a re-orientation of the public mind as to the purpose and value of children. In a peasant society children are regarded as economic assets; in an urban or more industrialized society the young child is considered a liability until his education is finished. Under the latter circumstance, therefore, parents tend to desire no more children than they can care for until the children

become self-supporting. Fewer children with higher cultural standards are preferred.

The question is, how can we convince the masses of fellaheen that numerous children are not necessarily an advantage? Several ways may be mentioned.

1. *Raising Standards.* The first step includes raising the standard of living by various devices, and this would probably result in decreased fertility. In more advanced societies, growing and healthy children themselves possibly bring such satisfaction to the parents that the psychological longing for children is appeased. On the other hand, in groups where infant mortality is high, the constant anxiety lest children may not grow to maturity may create greater longing and consequently greater fertility. One might state this hypothesis in terms of child-years in this way: one child living to maturity, that is with 20 child-years, gives greater satisfaction than four children living an average of five years each, which would also be 20 child-years. But in the former case the birth rate would be just one-fourth that of the second case.

Our aim then would be to do everything possible to sublimate the emotions and attention of the fellaheen while trying to raise their living standards. Emphasis needs to be put on the use of leisure time. Imagine the drab conditions of a village after sundown with no lights, no amusements, no diversions of any kind except sex. *Time Magazine* some years ago reported that the new quarters being provided in Libya for Italian immigrants were not to have electric lights, as Italian savants had observed a direct negative correlation between bright lights and the birth rate. If the long hours of leisure of the fellah could be filled with education, recreation, and wholesome amusements, all suitable to his type of life, living standards would be improved. With the installation of electricity, radios, cinemas, sports grounds, and various other improvements and diversions at an early stage in our plan, we would expect the birth rate to decline. In particular we need to raise the cultural



standards of the women. One Egyptian gentleman summed it all up recently when he said, "Educate the girls of Egypt and they will take care of the birth rate."

2. *Birth Control.* The second stage in holding down the birth rate would be to establish birth control clinics in which would be made available the knowledge of contraceptives, as demanded by those who respond to the influences of improved living standards. And as "birth control" means not only "birth limitation" but also "births at will," information on overcoming sterility would be included. While the main purpose is the limitation of excessive fertility, yet these two factors normally go together.

Perhaps the Egyptians could be persuaded that birth control is not necessarily associated with immorality, if they would follow its history in Europe and America. In many civilized countries it has become quite respectable. There is undoubtedly a lot of prejudice against it, presumably on religious grounds. Roman Catholics are openly opposed, but I know of no definite pronouncements by other Christian bodies in Egypt. The Moslem hierarchy is not opposed, as evidenced by the *fatwa* on the subject issued seven years ago by the Grand Mufti of Egypt, who would permit the use of contraceptives and sanction abortion before the fourth month, that is "before the child is gifted with a soul" or before movement is felt. The Sheikh al-Azhar gave tacit approval to this opinion, and other leading Azhar *ulema* spoke openly in its favor. Some opposition was voiced but it did not seem to have tradition on its side sufficiently to gain a hearing, although many sheikhs and some Moslem physicians are still hostile. However, a few years ago an Egyptian group, practically all Moslems of the upper class, organized "The Happy Family," which has for its aim the opening of a birth control clinic.

The attitude of the common people is problematical, except that it is well known that crude birth control methods, both direct and indirect, are constantly practised and that induced abortions are not uncommon, frequently with dire results to the mother. It is hard

to imagine that the situation could be made any worse for having these practices taken away from the "sheikhas" and put into the hands of qualified medical men and social workers. It is clear that much work needs to be done in the line of public education on the social values and ethics of birth control.

3. *Restrictive Legislation.* A third stage would be the gradual introduction of legislation designed to restrict propagation of the unfit, limit free social services, and raise the age of first marriage.

First, there are the eugenic measures that might be taken to reduce future numbers of those who are unfit and a social burden owing primarily to hereditary mental defects. From our point of view it is not important whether such limitation of defectives is accomplished by sterilization or institutionalization, just so long as something is really done. Recently, one of the *ulema* has declared that sterilization is in accord with Islam.

Second, there are several ways of using the social services to stimulate reductions in size of family:

a. Enforce compulsory education so as to take the children away from parental exploitation for five or more years; at the same time educate the first three children free but put a small tax on the fourth and those after, not enough to be a burden but just to serve as a warning.

b. Do child welfare work free for all children, but place a small tax on families having more than three.

c. Promise to exempt absolutely from military service the first son to attain the age, give a shorter period of service to the second (or if he is not needed, then exemption), and absolutely take the third and other sons; but compensate the parents with some sort of public recognition if the drafted sons are fit and accepted, for example, with decorations.

These devices possibly would cause the parents to think before having more than three children, and perhaps lead them to ask for birth control information.

Third, attempts should be made to raise the age of marriage, particularly of women. The fertile period of a woman's life extends from about ages 12-14 to ages 46-50, a length of from 34 to 38 years.

Since the most fertile years are the early years, the longer marriage can be delayed, the less will be the fertility. It was recently proposed by a lecturer in Cairo that marriage in Egypt should be prohibited before the age of 21; and if this should become fact, one might expect the birth rate to be reduced decidedly for this reason alone. In 1936, 63 per cent of spinster brides were under 20 years of age, as contrasted with 6.2 per cent of grooms.

Delayed marriage might result in an increase in prostitution, but this could be counteracted by the requirement of a medical certificate before marriage. In many countries, a certificate of good health for both partners is now a legal requirement. If applied in Egypt it is probable that the effect on the marriage and birth rates would be considerable.

But apart from legal enactments, there is a great deal of voluntary delay in marriage, especially among educated people. Numerous Egyptians of mature years are not married. In one group of 315 women who have secondary certificates and have been out of school three years or longer, there are 118 still unmarried.

After the delivery of this paper before the Cairo Scientific Society, I had expected some discussion, but the only response I got was the thanks of the Chairman. Perhaps it was because the hour was late. A few days afterward, one of the Egyptian government experts who had attended told me he was so shocked by the suggestions that he could think of nothing to say! I hope for better luck today.

## PROBLEMS OF POLICY IN RELATION TO AREAS OF HEAVY POPULATION PRESSURE<sup>1</sup>

FRANK W. NOTESTEIN

IN the next half century the size and distribution of the world's population will change rapidly. These changes will bring new demographic problems, and shift both the locus and form of old ones. Areas of Europe and Europe overseas in which technological civilization is most fully developed face slowing growth and perhaps gradual population decline. The phase of rapid growth which formerly characterized their populations is shifting to less fully developed areas such as Eastern Europe, the Soviet Union, and Japan. There, declines in fertility are well established but have not yet overtaken those in mortality which modernization has induced; hence growth is rapid.

In the remainder of the world, actual population change ranges from apparent decline in parts of Central Africa to very rapid increases in many areas of the Near and Far East and of Latin America. However, virtually all of these populations have high birth and death rates. In any of them the application of established techniques for the reduction of mortality would bring about a very rapid population growth. Irrespective of their past actual growth, such populations have the potentiality for rapid future growth. Populations with high growth potentials include most of those of Latin America, and, except for Japan, virtually all of those in which non-European cultures are dominant—in short, virtually all of the populations in the technologically undeveloped regions of the world.

Many of the world's undeveloped regions could absorb substantial growth readily enough. Throughout large parts of South America, Africa, and the Middle East, developments that would foster rapid population increase would also elicit the economic

<sup>1</sup> From the Office of Population Research, School of Public and International Affairs, Princeton University.

product to support that increase for a considerable period. In such areas population growth will present no considerable barriers to economic and political development for some time to come.

This paper deals with the much more serious problems of the regions that are already densely settled and still have high growth potentials, hence regions in which population growth may present serious obstacles to future economic and political development. They include Egypt, India, China, Korea, Formosa, Java, much of the Caribbean, and to a lesser extent the Philippine Islands and a number of other areas. However, the analysis treats the problems of this type of area in principle only. Illustrative materials are drawn from India, the Netherlands Indies, and the Philippines without any intention of suggesting that their situations are unique in principle. The essentials of the argument are equally applicable to the situation of Puerto Rico, Korea, Ceylon, and many other areas. We shall consider (1) the demographic situation, (2) the possibilities for checking growth, (3) solutions to the problem of pressure, and finally (4) problems of policy.

#### THE DEMOGRAPHIC SITUATION

Under conditions of stable government and economic development many colonial and semi-colonial areas have become densely settled for predominantly agricultural economies. In these areas human reproduction is grossly inefficient, for both birth and death rates remain high. Fertility is close to the biological maximum, and the presence or absence of growth depends principally on the course of mortality. Economic innovations that increase the production of the region serve to reduce mortality somewhat, thereby stimulating a growth that tends to consume the added product. Living levels have therefore risen little. Governments in a number of regions face the necessity of constantly expanding production merely to support growing numbers of people at the same subsistence level.

Populations living close to the margin of subsistence are highly

vulnerable to the shocks of even minor economic dislocations. Such shocks hold a constant threat of catastrophe. The low nutritional status of people increases susceptibility to disease, and minimum cereal diets permit no substantial contraction when food production falls below normal. Although the improvement in transportation effected by colonial governments has done something to check famine, in general the development of the regions as sources of highly specialized and valuable raw materials has introduced new risks to the populations arising from their dependence on world markets. The potentialities for increased productivity inherent in modern agricultural techniques have been utilized to some extent but have not effected any substantial modification of the demographic situation. Fertility remains high; hence the growth potentialities of the population remains unimpaired.

The dangers of overpopulation in densely settled agricultural economies with high growth potentials may be illustrated by the situations in India, the Netherlands Indies, and the Philippines. In details their demographic positions and prospects differ widely from each other, and from those of other areas of the same type. However, each has the fundamental characteristics of the type, which is the potentiality for future population growth of a magnitude that sooner or later threatens to become a serious obstacle to political and economic development.

India is the giant of the colonial areas by all measures of its importance. Its population is only a little smaller than that of all Europe west of Russia. It increased by 50.7 million between 1931 and 1941 to reach a total of 389 million at the latter date. By now the population almost certainly exceeds 400 million. The record of its past growth is typically Malthusian. The decade 1871-1881 was one of famine and negligible growth; that following was one of prosperity and had a recorded increase of 11 per cent. The great famines of 1899 and 1900 cut the increase of the decade 1891-1901 to less than 2 per cent. In the recovery from 1901-1911 growth

rose to 6.5 per cent. Between 1911 and 1921 a negligible increase of 1.2 per cent resulted from the death of at least 16 million people in the influenza pandemic and other high mortalities of the war years. Then for the first time since 1871 there were two successive decades of substantial growth. Between 1921 and 1931 the increase was 10.6 per cent and between 1931 and 1941 it was over 14 per cent. There is reason to believe that this rapid growth was due in part to a public health program that was increasingly effective after 1925.

Both the presence of growth in the favorable years and its absence in the unfavorable ones must be considered normal in India. As may be seen from the data in Table 1, if growth were continued at the rate of the favorable years 1921 to 1941 it would require only 57 years for the population to double itself. Such doubling would doubtless be possible if there were a rapid economic development. In the absence of such change it is quite unlikely. There are already 95 persons per square kilometer of territory that contains much arid and semi-arid land. Moreover, 67 per cent of the population is dependent on agriculture, less than 9 per cent of it lives in cities of 10,000 or more,<sup>4</sup> and 91 per cent of the population ten years or more is illiterate (about 88 per cent in 1941). We may conclude that in the absence of sweeping economic development recurrent catastrophes are virtually inevitable.

The underlying demographic situation is reflected in the vital rates presented in Table 1. In the years 1930-1931, which seem typical of relatively favorable conditions, the birth rate was probably between 43 and 49 per 1,000 and the death rate was between 30 and 36.<sup>5</sup> The mortality experience of favorable years suggests an expectation of life at birth of slightly over 30 years, a figure that times of catastrophe sharply reduce. In spite of such terrific mortality the natural increase exceeds one per cent per year. Given the per-

<sup>4</sup> Though official figures are available, many births and deaths are not registered, so that published rates are clearly too low.



petuation of past trends, one may expect increases of the order of 50 million per decade until they are checked by new and larger catastrophes.

The Netherlands Indies have a notable record for economic development and "beneficent rule" in an area containing at once some of the world's most densely as well as most thinly settled regions. Much of the area of the Outer Islands is virtually uninhabited. On the other hand, no more perfect laboratory for the

Table 1. Selected demographic indexes for India, the Netherlands Indies, and the Philippine Islands.<sup>1</sup>

INDEX	INDIA		THE NETHERLANDS INDIES			THE PHILIPPINE ISLANDS	
	Date	Amount	Date	Amount		Date	Amount
				Total	Java and Madura		
<i>Population</i> (000 omitted)	1941	389,001	1930	60,727	41,718	1939	16,000
<i>Density</i> Population per Km <sup>2</sup>	1941	95.4	1930	31.9	316.1	1939	33.8
<i>Growth</i> Average Annual Per Cent Growth Years Required to Double Popu- lation at This Rate	1921-1941	1.21	1920-1930	1.08	1.76	1918-1939	1.20
		57		33	39		31
<i>Vital Rates (Est.)</i> Births per 1,000	1930-1931	43-49	1929-1930	43-51	41-51	1930-1931	41-51
Deaths per 1,000	1930-1931	30-36	1929-1930	27-37	25-35	1930-1931	21-31
Natural Increase per 1,000	1930-1931	10-16	1929-1930	5-20	11-21	1930-1931	17-27
<i>Illiteracy</i> Per Cent Population Age 10+							
Illiterate	1931	91.	1930	91.	93.	1939	51.
<i>Urbanization</i> Per Cent Population in Cities of 10,000+	1931	8.75	1930	6.98	8.17	1939	20.67
<i>Dependency on Agriculture</i> Per Cent Population Dependent on Agriculture	1931	67.	1930	73.	70.	1939	76.

<sup>1</sup> From the Office of Population Research, Princeton University. The values entered are those that seem most reasonable in view of all available evidence. They are not necessarily those given in official reports.

study of the Malthusian theory can be found than Java and Madura. There internecine wars, insecurity of person and property, primitive productive techniques, and the uncontrolled spread of disease kept the population in check until the eighteenth century. Then the colonial administration of the Dutch began to maintain peace and order, improve agricultural techniques, and introduce elementary sanitation and hygiene. The native population grew from about 5 million in 1816 to 13 million in 1860, 30 million in 1905, and 41 million in 1930. In the seventy years from 1860 to 1930 the native population apparently multiplied more than three times. By 1930 there were more than 800 persons per square mile (316 per sq. km.) and in three provinces density exceeded 1,000 persons per square mile. Such densities are frequently found in industrial economies, but in agricultural economies like that of Java they are found elsewhere only in the Ganges and Nile valleys and in some parts of China. At the rate of growth of the decade 1920-1930 it would require less than 40 years for the populations to double (Table 1).

Unless there are drastic changes, sooner or later there must come a point at which continued increase forces down living levels, so that mortality will begin to rise. The colonial administration has pushed that point back and back by the development of agriculture and, to a lesser extent, of industry. Until recent years, the needs of the growing population have been met by the expansion of cultivated areas onto virgin soil, the increased productivity of the lands already under cultivation, the construction of improved irrigation works, and the development of better varieties of native and commercial crops. However, the limits of such development had been virtually reached by 1930. In 1938 the natives of Java and Madura had .20 acres of irrigated rice land per capita and .27 acres of non-irrigated land, or a total of less than half an acre of agricultural land per capita. The 19 million acres in native agriculture and fisheries constituted 60 per cent of the area of the islands. This

native agriculture was highly vulnerable to changes in the world demand for its products. In 1937, 36 per cent of the total value of exports was the product of native enterprise. Natives produced 49 per cent of the export value of rubber, 67 per cent of that of coffee, and 95 per cent of that of coconut products. The general situation is that of a relatively efficient and highly specialized agricultural development which has scarcely more than kept pace with the population growth and now faces the limit of its expansion with the growth potential of the population unchecked.

The depression made necessary the immediate facing of a problem that had to be met in the near future at any event. Government statisticians point out that a continued increase of 1.5 per cent per year would yield a population of 116 million by the year 2000, an obviously impossible figure. The only solution that appeared to the government as having a reasonable chance of success was the planned colonization of the less densely settled Outer Provinces. Colonists transferred under this program increased from 13 thousand in 1936 to 45 thousand in 1939. Before the war the government had set an ambitious goal of 100 thousand colonists a year to be reached in eight years, the colonists to be carefully selected young married people in order to yield a maximum population reduction in the home islands. It was estimated that with an average annual emigration of 80 thousand couples with one child, the population of Java and Madura would increase from 42 million in 1930 to only 74 million in 2000—a density of a little over 1,400 persons per square mile. However, apparently scant attention was given to the need for innovations calculated to reduce fertility and check population growth at its source. The experience of the Netherlands Indies exemplifies the fact that good administration, of itself, offers no escape from the dilemma of all-consuming growth.

The Philippine Islands illustrate the problems of a less congested area where considerable improvement in health and education has been effected with unusual rapidity. Fortunately, the pressure here

is less than in either Java or India, the average density being only slightly more than half that of India and one-sixth that of Java and Madura. This relative sparsity does not arise from factors fundamentally different from those of the other two areas, but simply from the fact that the Philippines have been under the control of a progressive nation for a shorter length of time. Thanks to efforts since 1900 in the fields of public health and education illiteracy stands at 51 per cent and death rates are now relatively low, probably between 21 and 31—the lowest among Asiatic colonial populations. However, 76 per cent of the people are dependent on agriculture, and only 11 per cent live in communities of 10,000 or more inhabitants. Birth rates remain those characteristic of colonial peoples, being probably between 42 and 52 per 1,000. Natural increase in peacetime probably ranged between 17 and 27. Between 1918 and 1939 the population apparently increased by an average annual rate of 2.2 per cent. Maintenance of this increase would double the population in about 32 years. The problem of the Philippines is less pressing than that of Java or India because the carrying capacity of the Islands is less fully utilized. However, at recent rates of growth it will not require many decades for congestion to become severe.

The fundamental causes of rising population pressures are substantially the same in all densely settled colonial areas. Prior to the advent of modern government, more efficient economic production, and elementary sanitation, death rates were very high and populations were more or less in balance at the densities possible with inadequate economic techniques. All such societies, if they are to survive, must have high fertility, and universally their social structures are those that elicit high birth rates.\* Family form and function, religious doctrine, and community custom are all focused toward the maintenance of high fertility. High evaluations are placed on

\* There is no evidence that innate biological differences in the ability to reproduce, if they exist, have been of substantial importance in creating the differences in reproduction. Differences in social attitudes toward controls of fertility have been the dominant factors.

the perpetuation of the family, clan, or other group, but low evaluations on the individual and his welfare. These values are deeply imbedded and rigidly enforced by social sanctions. Even under the impact of a rapidly shifting environment, they change only gradually.

At the first advent of the European, native populations were often decimated, and occasionally wiped out, by exposure to diseases to which they had no immunity. However, after the initial stages, mortality began to decline. The areas have been developed by the technologically advanced countries primarily as sources of agricultural and mineral raw materials, often of a specialized kind, and as markets for manufactured goods. Such development has required the introduction of strong government, improved transportation, simple sanitation, and a modicum of epidemic control, together in many instances with sufficiently ameliorated living conditions to ensure a supply of tolerably efficient labor—the whole often stimulated and supported by genuinely humanitarian ideals. All such innovations reduce mortality.

Fertility, on the other hand, has declined not at all or very little.<sup>4</sup> In fact, the only societies in which low birth rates have appeared are those dominated by the values developed in modern urban life.<sup>5</sup> Such societies set great store by the individual, his health, welfare, initiative, and advancement. They develop a rational and materialistic outlook on life, view man as the master of his own destiny, and come to hold the deliberate control of fertility to be as reasonable and desirable as that of mortality. The transition from the earlier set of values to the new individualistic ones is gradual. Therefore, universally the decline in the birth rate lags behind that of the death

<sup>4</sup> Statistical records throughout the areas under consideration are highly inadequate and inaccurate, so that careful assessment of the trends over long periods is impossible.

<sup>5</sup> There have been instances of fertility rates inadequate for the maintenance of a stationary population, but only under conditions of mortality rates that were high by modern standards. A fertility that would be sufficient only to maintain a stationary population in ancient Rome, where the expectation of life at birth probably did not exceed 30 years, would maintain rapid growth in a population with an expectation of life at birth of 60 years.

rate until both reach rather low levels. The interim affords a period of rapid population growth. Europe is only now coming to the end of its period of expansion.

The uses to which technologically backward regions have been put, and the nature of the policies of dominant nations toward them, have been such as to impede the transition to low fertility. Agricultural life has been promoted; native industries have faced the competition of established industries of technologically advanced countries. Industrialization and urbanization have developed very gradually. Moreover, in general and especially under the more enlightened colonial regimes, there has been considerable protection of native customs, religions, and social organization, all of which foster the maintenance of high fertility. In short, the technologically advanced nations have disseminated and imposed that part of their culture which reduces mortality, while withholding, or at least failing to foster the transfer of, that part of their culture out of which the rational control of fertility and the small-family pattern develop. The population grows a good deal as it did in the West, but unlike the situation in the West, the growth stage has not been accompanied by the social changes that eventually lead to an end of expansion.

The significance of rapid growth for future political and economic development in the areas under consideration depends on a variety of factors, such as the stage of economic development, the resources on which new industries may be based, the outlets for settlement, the sheer size of the populations, and the future policies of the dominant powers toward them.

Given a perpetuation of the past policies of developing the regions primarily as sources of raw materials, it is altogether probable that population will increase more rapidly than the means of subsistence in some areas. In such cases hunger, pestilence, and war will remain the major controls of growth in any future that matters. The areas will undergo recurrent catastrophes that will shock the con-

science of the world. They will be increasingly expensive and troublesome to administer, and unsatisfactory to do business with. Of themselves they will be too impotent to threaten the peace, but probably they will be discontented, disloyal, and ready, if somewhat inefficient, materials for each new political conflagration. India is a likely candidate for this group.

Other regions, those whose readily available resources are now less fully developed, may emerge with sufficient political unity and industrial strength to give their growing numbers power. Failing to find a solution to their problems within their own borders, they may easily become threats to world peace by their endeavors to expand. Sections of the Near East and China are perhaps the most likely candidates in this group.

Neither of these situations is satisfactory from the point of view of the humanitarian ideals, economic interests, and the peaceful security of the United States. Its interests are almost as directly involved as are those of the major colonial powers and, in an ultimate sense, they are more directly involved in the problems of areas not under its control than in those of the smaller areas that it governs. Since past policies have failed to prevent the development of critical situations, it is necessary to consider possible alternatives to their re-establishment.

#### THE POSSIBILITIES FOR CHECKING GROWTH

The obvious solution to the demographic problem of the regions under consideration might seem to lie in measures designed to check growth. There are only three factors to manipulate: birth, death, and migration. Losses can be increased by raising mortality and stimulating emigration, or gains can be reduced by checking fertility. However, since none of these factors is independent of the others, the problems are far from simple.

Death rates could be permitted to rise; indeed it will be difficult to prevent their rise. Policies designed to yield such a trend are



occasionally suggested as a temporary expedient to obtain release from pressure, pending a decline in fertility. However, as will appear below, the suggestion is based on a misconception of the factors governing growth. A period of increasing mortality would in fact impede the developments essential to induce a decline in fertility. Rising mortality in the areas under consideration means in reality rising population pressure, and not a solution to that pressure.

Moreover, it is essential to remember that death rates remain high, and that such improvements as have taken place are largely the result of innovations essential to the economic development of the regions on whose specialized products much of the economic welfare of the West depends. A deterioration of existing conditions would disrupt the economies of the regions. Increasing economic intercourse between West and East cannot be profitably maintained in the face of recurrent catastrophes or lower levels of physical health than already exist.

Any policy that permits an increase of mortality would not solve the problems of population pressure and would adversely affect the economic interest of the American citizen, as well as grossly offend his humanitarian attitudes. It could be rationally advocated only as a means of weakening the power of peoples that might at a later date gain sufficient strength to threaten the security of the Western world.

Emigration obviously increases the losses of the sending population. However, it does not necessarily reduce the size of the total population. If fertility is so high that the population is pressing on the means of subsistence, and mortality is the principal check to growth, emigration will temporarily relieve that pressure, but will then lower mortality and increase growth to cancel the effect of the outward movement. Other factors remaining equal, in this situation emigration would not permanently alter the problems of the sending areas, but would vastly increase the total size of the sending stock in the world. Thus the calculations of officials in the Nether-

lands Indies are somewhat naive. They presuppose the maintenance of a rate of increase of 1.5 per cent per year until the year 2000 for Java-Madura, then subtract quotas of migrants. In the absence of rather profound changes in the economy, there is no reason to suppose that the growth could be maintained at that level, or that the population of Java-Madura would be any less with the scheduled migration than without it.

Whether emigration can reduce population depends largely on the magnitude of the migration in relation to the parental stock, on the duration of the movement, and on intervening social developments. These factors are principally a function of the size of the population under consideration. Emigration as the sole solution to the problems of Egypt, India, China, Java-Madura, and other areas would increase the number of Egyptians, Indians, Chinese, and so on without substantially altering the problems or conditions of life in their countries, at the same time probably tending to create similar conditions in the areas of destination.

On the other hand, heavy and lasting emigration from small to large regions, as, for example, from Puerto Rico to the United States (or the past migration from Ireland), would assist the development of social changes out of which low fertility develops, thereby facilitating a permanent solution. The solution depends on the availability of receiving areas. Analogous migrations probably could help solve the problems of many small congested islands in the Pacific.

In general, however, emigration will not check growth in the most important areas of population pressure at the present stage of their demographic evolution. It would be unfortunate to waste the open spaces of the world in a fashion that could only intensify future problems of adjustment.

It is frequently suggested that efforts should be made to reduce birth rates before further declines in the death rate are permitted. To this end there are some advocates of the view that a widespread

dissemination of contraceptive knowledge and materials should replace efforts now being made in the field of public health. The proposal arises from a misunderstanding of the factors controlling fertility, and of the role of birth control. Both indirect evidence and that of pertinent experiments have shown that:

1. Populations whose social institutions and personal aspirations are those developed in high mortality cultures are little interested in contraception and will not make effective use of the methods normally at their disposal. Of course, in nearly all cultures some individuals practice contraception and resort to a variety of other controls of fertility. However, they do not do so in sufficient numbers and with sufficient effectiveness to bring about any very substantial reduction of the fertility of the group.

2. Conversely, populations whose institutions and personal aspirations are those of modern individualistic cultures will control their fertility in substantial degree with or without the assistance of modern contraceptive techniques. Nearly all peoples have at their disposal the knowledge of contraceptive practices that are in fact used with great effectiveness in some populations.

The dissemination of contraceptive knowledge as the *sole* solution to the problems of population pressure is of little importance. In an appropriate social-economic setting, birth control propaganda, contraceptive and other, and birth control clinics undoubtedly can and do serve important educational purposes, and can be very useful in hastening the reduction of fertility. Contraception is an important means, among others, by which people can control their fertility. Whether they control it depends on the social setting; hence new patterns of behavior are to be established principally by the alteration of that setting.

From the foregoing analysis it must be concluded that, in the regions under consideration, population growth can be promptly checked only by rising mortality. However, that check would afford no solution to the problems of population pressure, and would

react unfavorably on the immediate economic interests of our own population and on that of other dominant powers.

#### SOLUTIONS TO PROBLEMS OF POPULATION PRESSURE

There is no quick demographic solution to the problems of population pressure in the areas under consideration. However, there are solutions, at least in principle. Population pressure in the short run is no more a matter of too many people than it is of too little product. Pressures may therefore be relieved by a rapid expansion of product. It is not the problem of doubling, or perhaps even tripling, the product of backward regions that staggers the imagination; it is the need for an indefinite continuation of such an expansion in order to keep up with an unending growth. The demographic problem is not that of putting an immediate end to growth, but of checking growth before the populations become unmanageably large—for example, before the present numbers are doubled. The immediate and pressing demographic problem, therefore, is the early reduction of the potentialities for future growth.

Paradoxically, a reduction of the growth potentialities can be achieved only on terms of increased population growth in the near future. Both mortality and fertility have a long way to fall before a balance is achieved. Fertility declines will come gradually and only after the people acquire new interests and aspirations. These new interests are likely to develop only in a period of rising levels of living, urbanization, widespread education, and growing contacts with foreign cultures. All such developments would initially reduce mortality more rapidly than fertility and therefore temporarily enhance growth. In its analogous period of transition from high to low vital rates, European population increased from two to fourfold. There is little reason to suppose, if the situation is allowed to drift along past lines, that today's backward people could accomplish their vital transition with less growth.

The crux of the problem is the greatest possible reduction of the

lag between the downward trends of mortality and fertility. If relief from population pressure is the goal, it is dangerous to continue frittering away the productive power of modern techniques in a social setting calculated to maintain high fertility. There is urgent need to apply in synchronized fashion every device for the creation of a social setting favorable to reduced fertility. This in fact would require a complete and integrated program of modernization.\*

Something of the scope of changes required to bring as rapid a decline of fertility as possible is suggested by the following outline.

1. Economic—The Substitution Within Feasible Limits of the Rounded for the Colonial Economy

a. The development of industries to support large urban populations. Such a development takes people out of their former context, breaks the cake of custom, and permits the growth of new individualistic aspirations. Moreover, it is essential to draw a surplus and ineffective agricul-

\* The question may be raised whether the transition to low fertility can be made by the peoples of today's undeveloped regions even under the most favorable conditions. Will people living in different climates, having different racial origins and widely different cultural backgrounds, modify their reproductive behavior in response to changing environments in the same way that persons of European origins have done? The weight of available evidence suggests that they will. That evidence cannot be marshalled in the present paper, but two or three points may be noted.

There is clear evidence that fertility is not primarily a matter of race or climate. Examples of fertility of the European type exist among all important races and in all important climates. Neither is low fertility a characteristic of European culture as such. The low fertility of today came only as the modern technological, urbanized society developed. Moreover, in cultures as diverse as those of the Soviet Union, Eastern Europe, Western Europe, New England and the Southern United States, and Australia, there has been a notable similarity in the way trends toward lower fertility have developed in relation to improving health, increasing urbanization, and rising educational and economic status. Careful study of these patterns suggests that well-rounded modernization is susceptible of transfer to people of widely different cultural backgrounds, and elicits similar modifications of reproductive behavior.

The conclusion is supported by the experience of Japan. There is clear evidence that its demographic behavior closely parallels that of Western Europe as to its time trends and its geographic and social-economic patterns. The lower fertility of large cities than of rural areas in India is further evidence of the same sort. However, the apparent failure of the differentials to increase in recent years, and their virtual absence in Egypt, should serve as a warning. Western patterns of reproduction cannot be expected to develop from the imposition on other cultures of one or two gross externals of Western life. More adequate knowledge of the precise determinants of reproductive behavior, especially in the many Oriental cultures, would undoubtedly permit greater efficiency in inducing a fertility decline, and this knowledge is among that most urgently needed in the field of demography. Pending its acquisition, we must assume that the reduction of fertility among today's backward peoples will come only in response to a combination of the major elements which preceded that response in the modern nations of the West.

tural population into effective production. The development of light industries, such as textiles, in which women can be employed away from the home, is especially important as a means of giving women new independence and a milieu for the dissemination of new ideas.

b. The rationalization and extension of agriculture. Such rationalization would include the improvement of techniques, the reform of land tenures and credit systems, the development of new areas, and such diversification of production as the requirements of high productivity permit. It would not include the extension of subsistence farming as a substitute for commercial agriculture.

c. The promotion of international trade. Trade is one of the most important means of diffusing new ideas and attitudes.

## 2. Educational

The rapid extension of popular education through all available mediums designed, unlike the education in some colonial systems, to create new wants for physical and material well-being, and the skills appropriate to modern techniques in industry and agriculture.

## 3. Birth Control

It is important that specific and widespread propaganda be directed to developing an interest in the health and welfare of children rather than in large families for their own sake. Such education would also involve propaganda in favor of controlled fertility as an integral part of a public health program. As a matter of economic necessity, the efforts would have to be confined largely to the educational level.

## 4. Public Health

The matter cannot be rigidly proved, but the writer is profoundly convinced that only a society in which the individual (child or adult) has a reasonable chance for survival in healthy life will develop that interest in the dignity and material well-being of the individual essential to the reduction of fertility. He therefore firmly believes in directly fostering public health *as part of the program required to reduce growth potential*.

## 5. Political

It is important to develop a native leadership that will acquire new values rapidly and serve as a medium for their diffusion. To this end native political leaders, civil servants, and native middle classes are needed.

6. Social

It is important that caste and other barriers to the advancement of the individual be broken down as rapidly as possible.

7. Migration

If a train of events of the sort suggested above were under way, migration could be of invaluable assistance in facilitating the transition to low fertility. Under such circumstances emigration becomes more than a substitute for reduced fertility. By relieving the pressure of population during the transitional stage of rapid growth, it fosters the rising levels of living essential to the maintenance of that transition. Much of Europe's migration to the United States has been of this character. If the curtailment of the growth potential is the object, the world's areas available for settlement should be reserved for migrants from regions in which the downward trend of fertility is already established. The empty regions are none too plentiful and should be used to some lasting effect.

Temporary migration, seasonal or other, should in all circumstances be encouraged as part of any program for the reduction of fertility. It is one of the most effective means of spreading new ideas, new skills, and new interests in the home population.

CONSIDERATIONS FOR AMERICAN POLICY

The foregoing analysis has indicated that a continuation of past policies toward the technologically undeveloped regions of dense settlement would almost certainly yield an intensification of population pressures with their resultant train of human poverty and suffering, perhaps to the extent of creating situations that are permanently insoluble. It has been pointed out that such a situation would adversely affect the immediate economic interests of this country and of other Western powers that are heavily dependent on the specialized products of these regions, and that the resulting catastrophes would grossly offend the humanitarian sensibilities of our people and the world.

The analysis has further shown that the escape from this situation of rising population pressure, if escape there be, lies in a highly complex and integrated program of modernization. Such a pro-



gram would yield populations that would be larger and stronger than those that would arise from the perpetuation of past policies. By launching a program of modernization the now dominant powers would in effect be creating a future world in which their own peoples would become progressively smaller minorities, and possess a progressively smaller proportion of the world's wealth and power. The determination of national policy toward the undeveloped regions must be made in the light of that fact.

It is the writer's belief that the perpetuation of past policies toward undeveloped regions involves greater risks to the peaceful security of the American people than a policy consciously designed to create larger and more powerful populations in these areas.

A program of repression must be universally successful to prevent disturbances of the world peace. Such universally successful repression is hardly to be expected in a world in which the spread of education and modern technology has gone too far to be stopped. Almost inevitably some major population would acquire the political unity and industrial skill to give its people power while its growth potential remained high. In a world where dominant nations jealously withhold economic assistance, the emerging nation would receive new and punishing lessons on the impossibility of achieving a demographic balance within its own borders. Such people could be expected to learn these lessons, and to threaten the peace by their efforts to obtain a solution through expansion.

On the other hand, a program of modernization would amount to giving a practical demonstration for some decades of the possibility of achieving an internal solution to the most serious problems of population pressure on the basis of industrial production, increasingly efficient agriculture, and world trade. The fact that the demographic problems were on the way toward solution would, of course, be no guarantee of peaceful inclinations, as the present experience with Japan amply proves. Many other factors are involved in the formation of an aggressive spirit. However, it would

mean that one stimulus to aggression would be removed, and that there would be large vested interests in the perpetuation of peace.

Although the writer prefers to accept the risks of modernization, he doubts in fact that the choice of policy will, or should, be exclusively based on the balancing of distant risks. Other considerations seem more compelling and sounder bases for the formulation of policy in the light of values held by the American people. The immediate economic interests of the American people lie in the direction of a program of modernization of backward areas. Such a program would permit the continuation and expansion of mutually profitable economic intercourse, and there are powerful pressure groups to call that fact to the public attention. Of even greater importance is the fact that such a program of modernization coincides with the humanitarian ideals deeply imbedded in our culture.

The above consideration suggests that:

1. The interests of the United States, and of other major powers, are deeply involved in the problem of population pressure in technologically backward areas.

2. A goal of American policy, and of that of other leading powers, with respect to such areas should be to foster a reduction of the potentialities for population growth.

If this goal is accepted, it is essential to realize that:

1. There is no simple nor quick solution. The goal can be achieved, if at all, only by an integrated program of modernization, designed to establish a social milieu in which fertility will come under control.

2. Any such program requires the review of all social, economic, and political innovations from the point of view of their impact on fertility. Such a review can be made only with much more information about the details of social organization of each area than is now at hand.

3. The requisite changes cannot be made without the assistance of the dominant powers. Neither can they be imposed by them. They can only be developed cooperatively with leaders in the areas concerned.

4. Since the interests of all nations are affected by the population growth of such areas, there should be appropriate international machinery for the consideration of broad policy with respect to such areas, for

the formulation of policy with respect to international migration and settlement, and for the rendering of technical assistance.

Such an agency, or at least some agency, should also be concerned with fostering the development of information by which the demographic situations of these areas could be accurately appraised.

5. Having regard to the fact that any program of the sort suggested will be exceedingly difficult to carry out, it would be wise to concentrate the most intensive efforts on regions in which there are reasonable prospects for success. India is probably the last region on such a list. There, a deterioration of the existing situation will be avoided only with great difficulty, and a major catastrophe is easily within the bounds of possibility.

6. The United States is in the unpleasant position of having an interest in the demographic development of large areas outside its political control, while having conspicuously failed to solve the much simpler problems of smaller areas that it has governed. If it is to urge its interest in the colonial policies of other nations, it should undertake an energetic attack on the problems of its own colonial areas, notably those of Puerto Rico.

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